This copy is a reprint which includes current pages from Changes 1 through 4.

9-1015-200-10/990

TM 9-1015-200-10

CHECK FOR CURRENT CHANGES
REVISION
SEE PAGE i FOR DETAILS

OPERATOR'S MANUAL
FOR
MORTAR, 81-MM, M29A1
(1015-00-999-7794)

HEADQUARTERS
DEPARTMENT OF THE ARMY
OCTOBER 1985

D 101.11:

READEX FICHE best copy available

WARNING

- Double loading of mortar ammunition has resulted in catastrophic accidents. Loading a mortar weapon with two men (alternately) can be very dangerous and could prove fatal. Even with one-man loading, double loading can occur. This is especially true in rapid fire exercises. For this reason, it is imperative that there be absolute certainty that the previous round left the mortar tube before a new round is dropped in.

- Upon releasing cartridge, pass hands downward and, at the same time, turn away from muzzle of mortar cannon to avoid blast which occurs when cartridge fires.

- Do not try to force a cartridge down mortar cannon.

- If misfire procedure does not cause the cartridge to fire and mortar is hot, wait until the mortar is cool enough to move with bare hands, or if the mortar is cool at the time of the misfire, wait one minute before removing the cartridge. Water or snow applied to the outside of the barrel can be used for cooling. This is to avoid an accident from possible delayed action of the ignition cartridge.

- Under no circumstances will base cap end of cannon be lowered again below a horizontal position until cartridge has been removed from cannon.

- Keep head and body away from the front of the mortar when removing a misfire.

WARNING

- Gunner must not put his hand on the base cap when lifting and holding barrel.
- Firing site must have enough mask clearance and no overhead obstructions.
- Don't park the carrier near any overhead obstructions that would block the projectile and cause a premature burst. You could get hurt or you could hurt other friendly troops.
- Dented barrels must be replaced as they are unsafe for firing.
- Mortar crew is required to use single hearing protection during firing.
- Dry cleaning solvents (SD) and paint thinners (TPM) are flammable. Do not clean parts near an open flame or in a smoking area. Dry cleaning solvents and paint thinners evaporate quickly and have a drying effect on the skin. When used without protective gloves, these chemicals may cause irritation to, or cracking of, the skin.
- For information on first aid, see FM 21-11.

WARNING

ALLOWABLE NUMBER OF ROUNDS PER DAY (ANOR)*

To reduce hazards from blast overpressure during firing, the mortar crew is required to use hearing protection. Using the proper head position and single hearing protection, the ANOR that can be fired each day are noted below.

800 SERIES AMMUNITION

CHARGE	ELEVATION	ANOR
3	800	180
3	1156	152
3	1511	>1000

300 SERIES AMMUNITION

CHARGE	301	374/375
4	50	**
8	143	--
9	--	125

*For training only, does not apply in combat.
**For M374A3/M375A3 series ammunition, ANOR = 106.

WARNING

The M800 Series Cartridges (M821 HE, M889 HE, M819 Smoke (RP), M853A1 Illum and M879 TP) are NOT to be fired above Charge 3. The M821 and M889 may be fired at Charge 3 ONLY in a combat emergency. Firing of the M821 and M889 for training purposes is limited to Charge 2. Firing above Charge 3 can cause SEVERE damage to the mortar and SEVERE injury to the crew.

All cartridges must be inspected for damage prior to firing. In addition, unpacked rounds which have been subjected to rough handling must be inspected prior to firing.

TECHNICAL MANUAL
No. 9-1015-200-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 23 October 1985

Operator's Manual
for
MORTAR, 81-MM, M29A1
(1015-00-999-7794)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Equipment Publications and Blank Forms) direct to: Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000. A reply will be furnished to you.

*This manual supersedes as much of TM 9-1015-200-12, 12 April 1971, including all changes, as pertains to operator and operator maintenance, and TM 9-1015-200-ESC, 20 March 1975, including all changes.

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M29A1 81-mm Mortar

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

SCOPE.

Type of Manual. Operator's
Model Number and Equipment Name. M29A1 81-mm Mortar
Purpose of Equipment. High angle fire for close-in support of ground troops.

MAINTENANCE FORMS AND RECORDS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

HAND RECEIPT (-HR) MANUALS.

This manual has a companion document with a TM number followed by "-HR" (which stands for Hand Receipt). The TM 9-1015-200-10-HR consists of preprinted hand receipts (DA Form 2062) that list end item related equipment (i.e., COEI, BII, and AAL) you must account for. As an aid to property accountability, additional -HR manuals may be requisitioned from the following source in accordance with procedures in Chapter 3, AR 310-2:

Commander
US Army Adjutant General Publication Center
2800 Eastern Boulevard
Baltimore, MD 21220-2896

NOMENCLATURE CROSS-REFERENCE LIST.

This listing includes nomenclature cross-references used in this manual.

Common Name	*Official Nomenclature*
Clevis locking pin	Quick release pin

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR's).

If your 81-mm mortar needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD, Rock Island, IL 61299-6000. We'll send you a reply.

Section II. EQUIPMENT DESCRIPTION

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

Equipment Characteristics. Provides high angle fire for close-range support of ground troops.

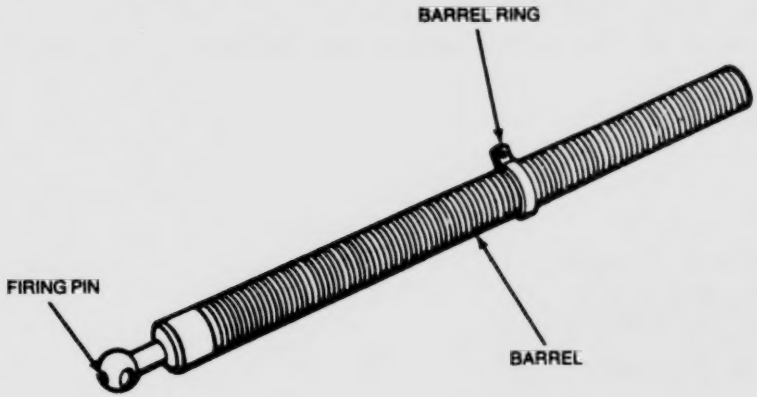
Capabilities and Features.

Muzzle-loading
High angle fire
Portable
Smooth bore

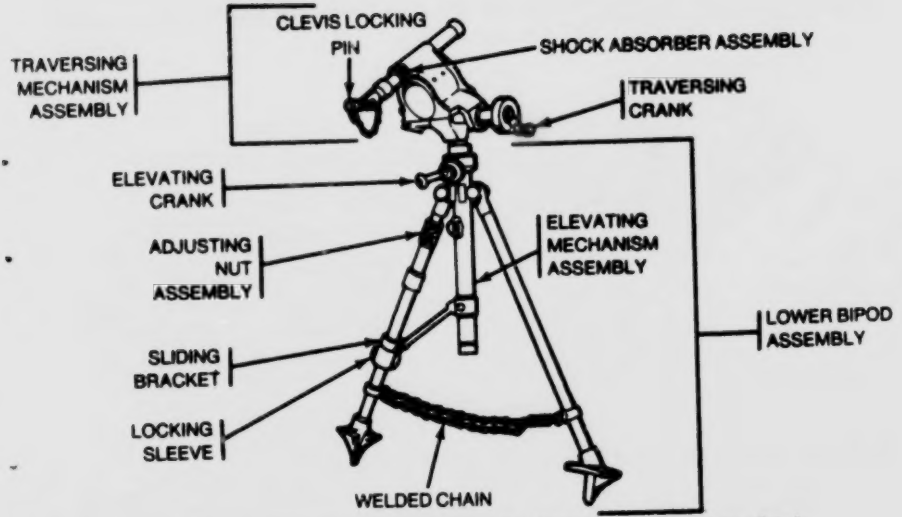
Major Weapon System Components:

(a) Cannon Assembly M29A1
(b) Bipod Assembly M23A1
(c) Baseplate M3
(d) Sightunit M53 or M53A1

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

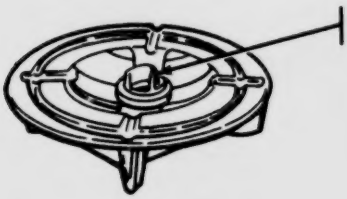


Cannon Assembly M29A1. Has a base cap and fixed firing pin for drop firing.

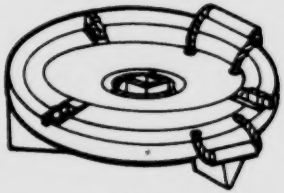


Bipod Assembly M23A1. Absorbs the shock of recoil in firing with a spring-type shock absorber.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued.



M3

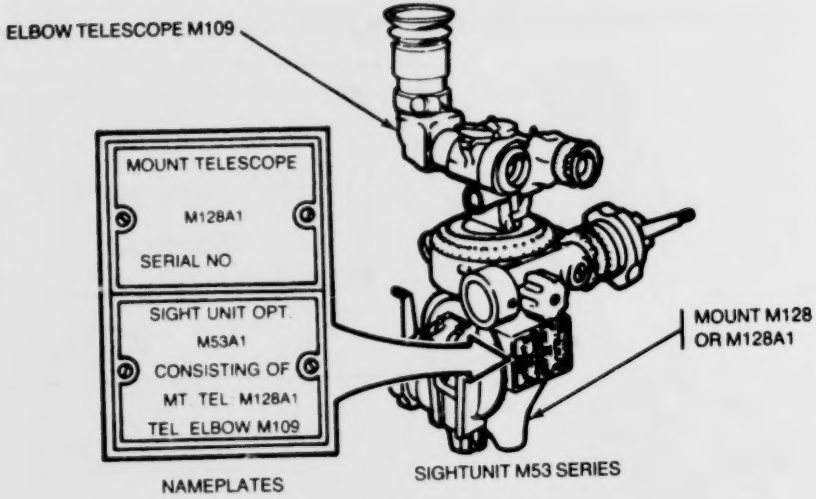


M23A1

Baseplate M3. Supports and alines the mortar and is made of aluminum.

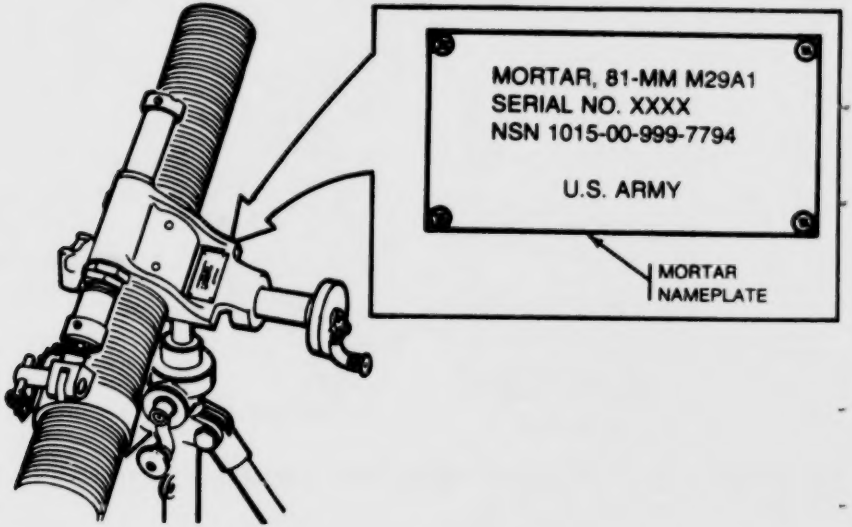
NOTE

Baseplate M23A1 is no longer stocked; therefore, only baseplate M3 is covered in this manual even though there are still old baseplates out in the field.



Sightunit M53 Series. Is a standard sighting device used to lay the mortar in elevation and deflection.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued.



EQUIPMENT DATA.

Physical Characteristics.

Weight:	
Cannon Assembly M29A1	28 lbs (12.73 kg)
Bipod Assembly M23A1	40 lbs (18 kg)
Baseplate:	
One piece M3	25.4 lbs (11.55 kg)
Two piece steel M23A1	48 lbs (21.83 kg)
Sightunit	
M53	5.25 lbs (2.39 kg)
M53A1	5.25 lbs (2.39 kg)
Dimensions:	
Overall length	51 in. (129.54 cm)
Width in carrying position	14.3 in. (36.32 cm)
Maximum width	21 in. (53.34 cm)
Overall height on bipod	37.5 in. (95.25 cm)
Diameter of baseplate	21 in. (53.34 cm)

EQUIPMENT DATA - Continued.

Elevation:
- Elevation (approx) . 800-1500 mils
- Per turn of elevation crank (approx) ..... 10 mils

Deflection
- Right or left from center (approx) ..... 95 mils

Total turns of handwheel for full traverse (approx) ..... 19 turns

Total deflection by movement of bipod without moving baseplate ..... 6400 mils

Rate of Fire.

	Rounds per minute	Period
Sustained	3 (charge 8)	Indefinitely
	5 (charge 6)	Indefinitely
Maximum	12 (charge 8)	2 minutes
	12 (charge 6)	5 minutes

Performance.

Range (approx) ..... 4737 meters
14803.12 ft
4934.376 yd

Section III. TECHNICAL PRINCIPLES OF OPERATION

1 Mortar is fired by dropping the cartridge down the cannon, base end first.

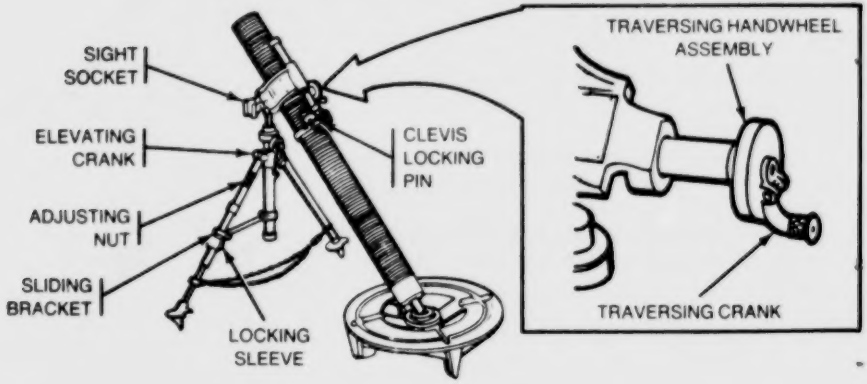
2 Cartridge, falling under its own weight, causes primer cap to strike the firing pin when bottom of cannon is reached.

3 The propelling charge is ignited by exploding ignition cartridge. Expanding gases force the cartridge from the mortar.

4 Fins provide stability in flight for nose impact.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS



LOCKING SLEEVE
Locks sliding bracket in place.

SLIDING BRACKET
Use for coarse adjusting the cross-leveling of the mortar.

ADJUSTING NUT
Makes final fine adjustment in cross-leveling.

ELEVATING CRANK
Changes the elevation of the mortar.

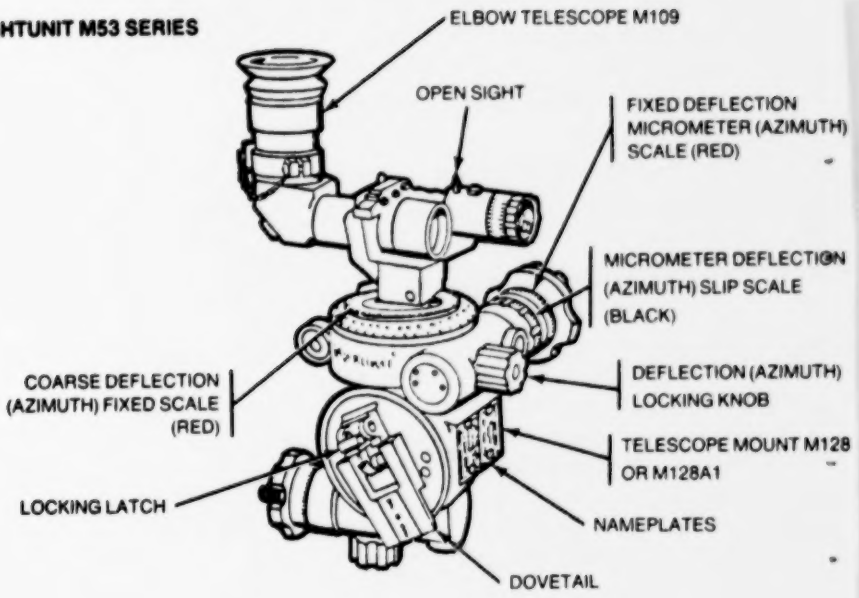
TRAVERSING HANDWHEEL ASSEMBLY
Use for slow and fine adjustments in deflection.

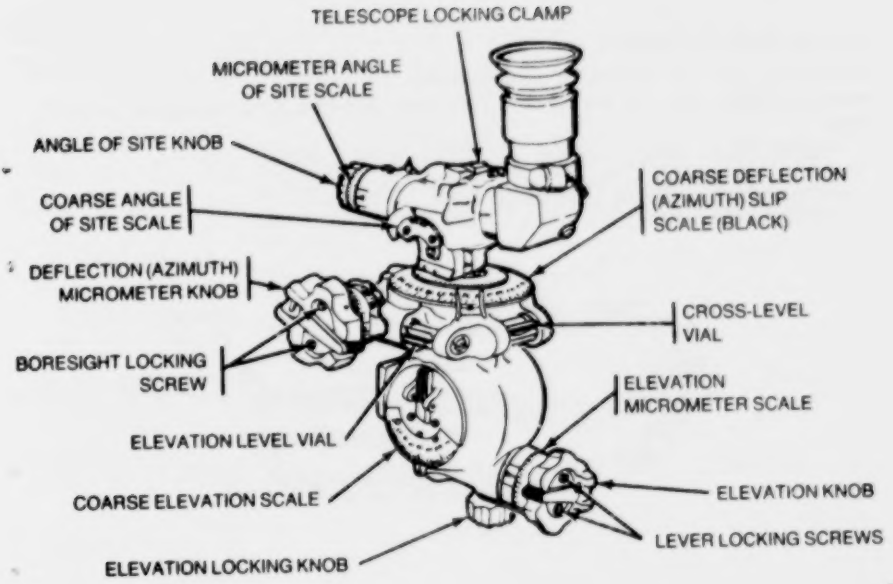
TRAVERSING CRANK
Use to make rapid and coarse adjustments in deflection.

CLEVIS LOCKING PIN
Locks bipod to cannon; locks clevis to lug (projecting from the elevating mechanism housing) for traveling.

SIGHT SOCKET
Use to attach sightunit M53 or M53A1.

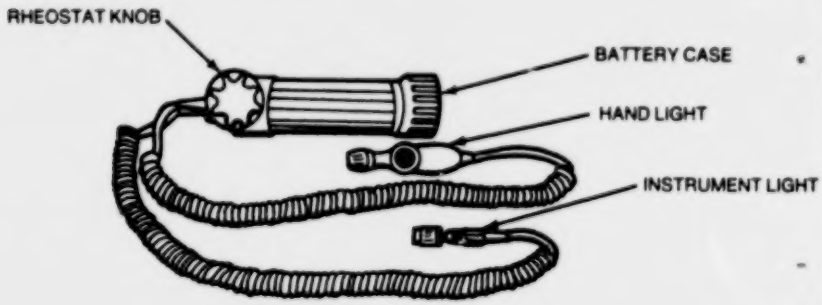
SIGHTUNIT M53 SERIES




TELESCOPE LOCKING CLAMP
MICROMETER ANGLE OF SITE SCALE
ANGLE OF SITE KNOB
COARSE ANGLE OF SITE SCALE
COARSE DEFLECTION (AZIMUTH) SLIP SCALE (BLACK)
DEFLECTION (AZIMUTH) MICROMETER KNOB
CROSS-LEVEL VIAL
BORESIGHT LOCKING SCREW
ELEVATION MICROMETER SCALE
ELEVATION LEVEL VIAL
ELEVATION KNOB
COARSE ELEVATION SCALE
LEVER LOCKING SCREWS
ELEVATION LOCKING KNOB

INSTRUMENT LIGHT M53E1.

Illuminates sightunit M53 series for night operating.
Instrument light screws into the sightunit. Hand light is provided to illuminate scales and level vials.



AIMING POST M1A2.

Provides reference point for indirect fire.

AIMING POST LIGHT M14

Illuminates aiming posts for night operation.
Mounted on aiming posts.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

The operator must perform scheduled services to be sure the 81-mm mortar will operate properly. Always keep in mind the WARNINGS AND CAUTIONS before and during operation. If your equipment fails to operate, troubleshoot and use the proper forms to report any deficiencies. See DA PAM 738-750.

Column B in the PMCS table is before operations checks. Column M is for monthly checks. When recording results of PMCS, entries in the PMCS Item No. column will be used for the TM Item No. column on DA Form 2404.

The "Equipment Is NOT READY/AVAILABLE IF" column indicates deficiencies which must be corrected before you can operate the 81-mm mortar.

Perform monthly as well as before operation PMCS if:

(1) You are the assigned operator and have not used the item since the last monthly inspection.

(2) You are operating the item for the first time.

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

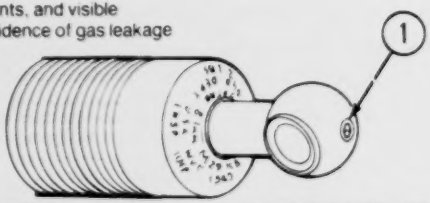
B - Before operation D - During operation A - After operation M - Monthly

Item No.	Interval B	Interval D	Interval A	Interval M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
1					DA FORM 2408-4	
	●				a. Check to see if your weapon has been borescoped and pullover gaged within the past 90 days.	
						Weapon has not been borescoped and pullover gaged within 90 days.
			●		b. Update DA Form 2408-4 to reflect day's firing.	
						After 5,000 rounds fired, weapon has not been borescoped every 500 additional rounds.

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	Interval D	Interval A	Interval M	ITEM TO BE INSPECTED Procedure	Equipment is NOT READY/ AVAILABLE IF:
2					**MORTAR**	
	●				Check that mortar is free of cracks, broken welds, rust or missing and damaged parts.	Mortar has cracks, broken welds, or missing and damaged parts.
3					**CANNON ASSEMBLY**	
	●				a. Check for foreign matter in barrel and wipe dry. Clean and lubricate exterior surface.	

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
	●	●			b. Check for bulges, dents, and visible cracks. Check for evidence of gas leakage around firing pin (1). 	Barrel is bulged, dented, or visibly cracked or shows visual evidence of gas leakage around firing pin.
			●		c. Use RBC (item 7, app D) to thoroughly clean barrel bore after firing and for two consecutive days thereafter.	

NOTE

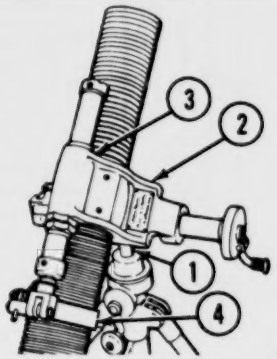
For nonfiring periods, barrel is cleaned and lubricated on a weekly basis.

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
4					**BASEPLATE**	
	●				a. Rotate U-shaped socket 360 degrees.	
	●				b. Check baseplate for cracks, broken welds, or loose, missing or damaged parts.	
						Socket does not rotate 360 degrees. Baseplate has cracks, broken welds, or missing or damaged parts.
5					**BIPOD ASSEMBLY**	
	●				a. Check bipod assembly for cracks, broken welds, rust, or loose, missing or damaged parts.	
						Bipod assembly has cracks, broken welds, or missing or damaged parts.

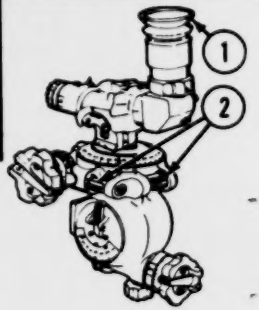
OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
	●	●			b. Elevating (1) and traversing (2) mechanism assemblies must operate smoothly and without binding through entire range of travel.	Elevating and/or traversing mechanism assemblies are inoperative.
			●		c. Clean and lubricate exposed bearing surfaces.	
	●				d. Test function the shock absorber assembly (3) and barrel ring (4) by operating manually with mortar in high range.	Shock absorber assembly or barrel ring is inoperative or binding.



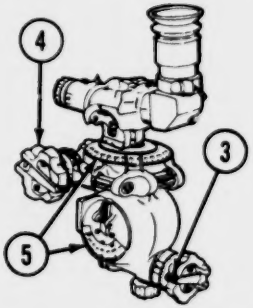
OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
6					**SIGHTUNIT M53 SERIES**	
	●				a. Check eyeshield (1) for damage. Check lenses and window for smears, scratches, cracks, or other obstructions.	Image is totally obstructed.
	●				b. Level vials (2) must not be cracked, broken or loose in mountings; covers must not be missing.	Vials are cracked, broken or loose in mounting.



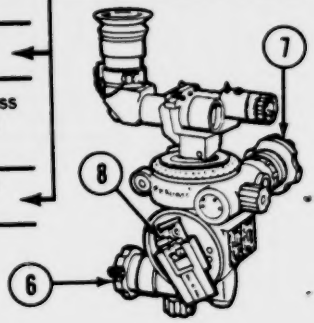
OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
	●				c. Check rotation of the elevation knob (3) and deflection (azimuth) knob (4) over entire range of movement. Motion must be smooth and even.	Knobs have excessive backlash.
	●				d. Check index lines and scales (5). They must be clear and distinct.	Scales and indexes cannot be read.



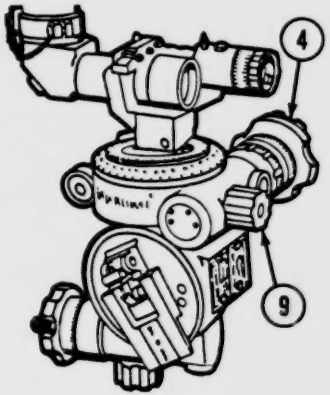
OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
					SIGHTUNIT M53 SERIES - Continued	
	•				e. Check elevation (6) and deflection (azimuth) (7) worm mechanism backlash. Must not exceed 0.5 of a mil.	Azimuth scale slips when locked; backlash exceeds 0.5 of a mil.
	•				f. Check locking latch clamp (8) for looseness and cracks. Also check that locking latch secures sightunit to mortar.	Locking latch clamp broken and/or does not secure sightunit.



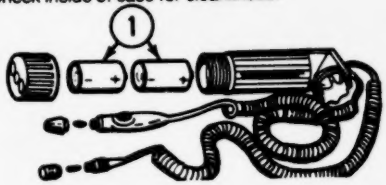
OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

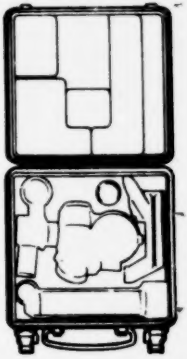
Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
	●				g. Check that mounting surfaces are free of nicks and burrs.	Nicks and burrs prevent proper seating in holder.
	●				h. Check that deflection (azimuth) knob (4) stays in position when locking knob (9) is tightened.	Deflection (azimuth) knob (4) slips when tightened.



OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

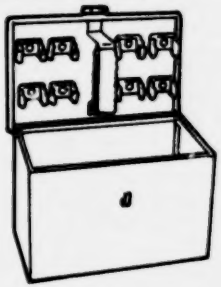
Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
7					**INSTRUMENT LIGHT M53E1 AND CASE M166**	
	●				a. Install batteries (1) and check switch, lamps, and batteries for operation.	Lamps do not illuminate.
			●		b. Remove batteries (1) after operation and check for corrosion.	
	●				c. Check leads for serviceability.	
	●				d. Check inside of case for cleanliness.	



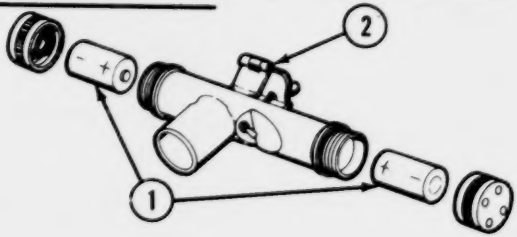


OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	Interval D	Interval A	Interval M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
8					**AIMING POST LIGHT M14 AND CHEST M14**	
	●				a. Check case, receptacle, and brackets for cracks.	Case, receptacle, or brackets are cracked.

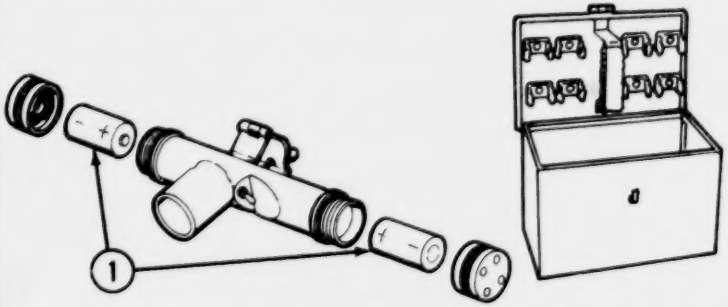


Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
					AIMING POST LIGHT M14 AND CHEST M14 - Continued	
	•				b. Install batteries (1) and check switch, lamp, and batteries for operation.	Lamps do not illuminate.
	•				c. Check that clamp (2) holds light securely to aiming post.	Clamp is broken.



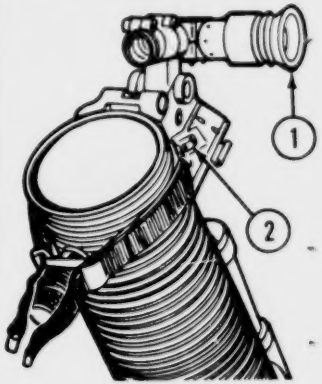
OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
			●		d. Remove batteries (1) after operation and check for corrosion.	
	●				e. Check inside of case for cleanliness.	



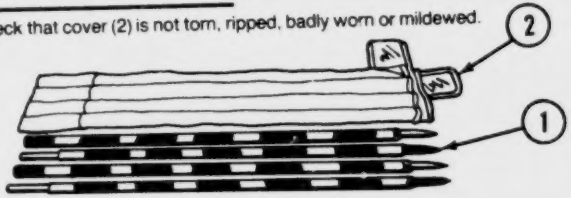
OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment is NOT READY/ AVAILABLE IF:
9					**M45 BORESIGHT**	
	●				a. Check eyeshield (1) for damage. Check lenses and windows for smears, scratches, cracks, or other obstructions.	Target image is totally obstructed.
	●				b. Level vials (2) must not be cracked, broken, or loose in mounting. Covers must not be missing.	Vials are cracked, broken, or loose in mounting.



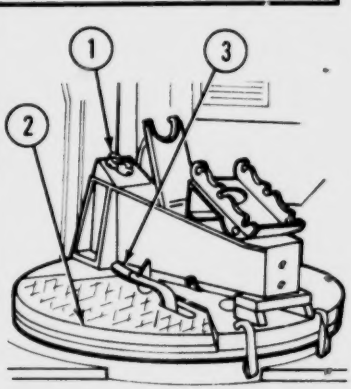
OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
10					**AIMING POST M1A2 AND COVER M401**	
	•				a. Check for completeness and that mating surfaces are clean, free of paint, and fit properly.	Mating surfaces do not fit properly.
	•				b. Check that posts (1) are not bent or broken.	Posts (1) are bent or broken.
	•				c. Check that cover (2) is not torn, ripped, badly worn or mildewed.	



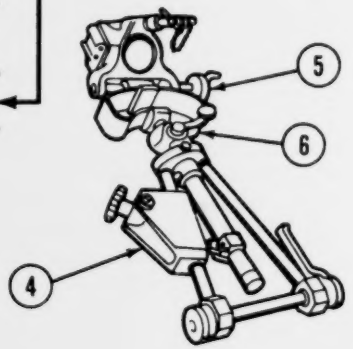
OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
11					**TURNTABLE AND STANDARD ON M125A1/A2 CARRIER**	
	●				a. Check that the mortar socket (1) secures cannon.	Mortar socket does not secure cannon.
	●				b. Rotate the turntable (2) and check for ease of rotation. Check that traverse handle (3) and lock are operative.	Turntable does not freely rotate; traverse handle and lock inoperative.



OPERATOR/CREW PREVENTIVE MAIINTENANCE CHECKS AND SERVICES - Continued

Item No.	Interval B	D	A	M	ITEM TO BE INSPECTED Procedure	Equipment Is NOT READY/ AVAILABLE IF:
	●	●			c. Check the bipod assembly cross-leveling (4), traversing (5), and elevating mechanism assemblies (6) for smoothness of operation through the entire ranges.	Cross-leveling, traversing, or elevating mechanism assemblies are inoperative.



Section III. OPERATION UNDER USUAL CONDITIONS

ASSEMBLY AND PREPARATION FOR FIRING - EMPLACEMENT OF MORTAR.

WARNING

Firing site must have enough mask clearance and no overhead obstructions.

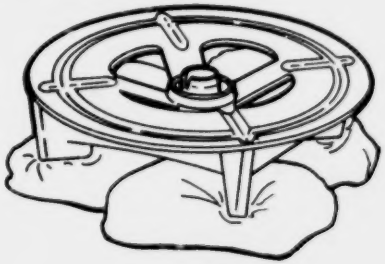
1 Select a firm, level site for emplacing mortar.

2 Prepare a horizontal surface upon which to place baseplate and bipod legs.

NOTE

When required to emplace and fire the mortar on solid surface:

- Place bags of dry sand or earth in a circular pattern (the size of the baseplate) on the ground.

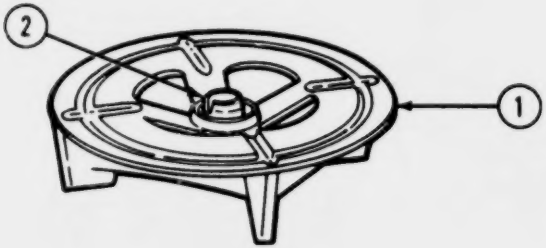


- Set baseplate on the bags and seat by jumping on it several times.

3 Place baseplate (1) on prepared site.

4 Set baseplate (1) firmly in place by jumping on it.

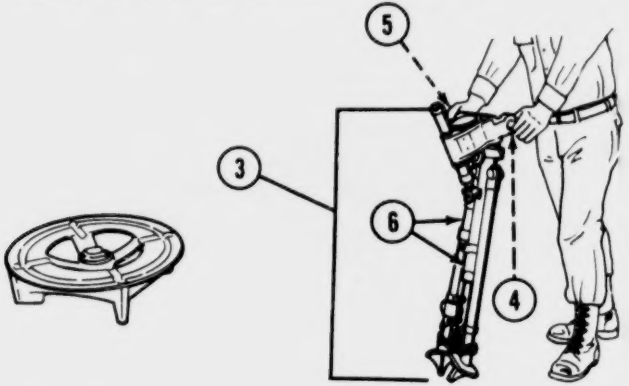
5 Turn the baseplate socket (2) in baseplate (1) so open end of the U-shaped opening is pointing in direction in which mortar is to be fired.



ASSEMBLY AND PREPARATION FOR FIRING - EMPLACEMENT OF MORTAR -Continued.

6 Lift the bipod assembly (3) by placing left hand on traversing crank (4) and right hand on sight socket (5).

7 Place bipod legs (6) about 2 feet in front of baseplate.

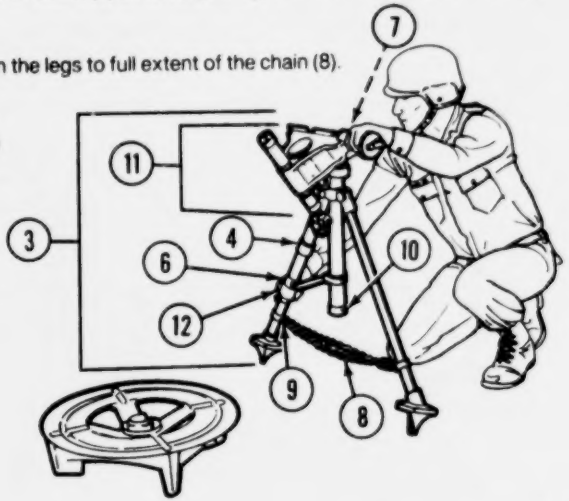


8 Kneel on right knee and support bipod assembly (3) with left hand on traversing nut (7).

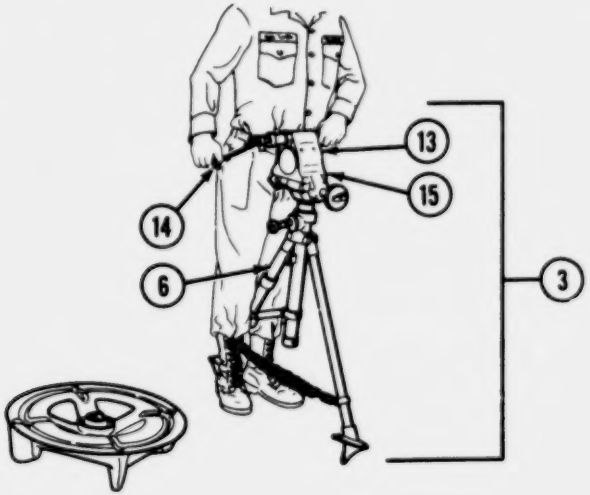
9 Unhook doubled chain (8) from chain hook (9) on left bipod leg, unwind it and rehook end loop on the chain hook (9).

10 Lift the left bipod leg (6) and open the legs to full extent of the chain (8).

11 Move the elevating mechanism assembly (10) to the left until the traversing mechanism assembly (11) is in a horizontal position. Tighten the locking sleeve (12).



ASSEMBLY AND PREPARATION FOR FIRING - EMPLACEMENT OF MORTAR -Continued.

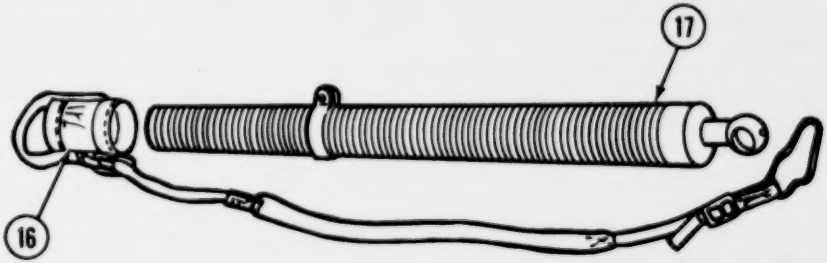


12 Straddle the left bipod leg (6) while supporting the bipod assembly (3) with your left hand on the shock absorber assembly (13).

13 Disengage the clevis locking pin (14). Raise the yoke assembly (15) to a horizontal position, with left hand on the shock absorber assembly (13).

14 Hold the clevis locking pin (14) and chain out of the way with your right hand.

15 Second man removes gun muzzle cover (16) from barrel (17).



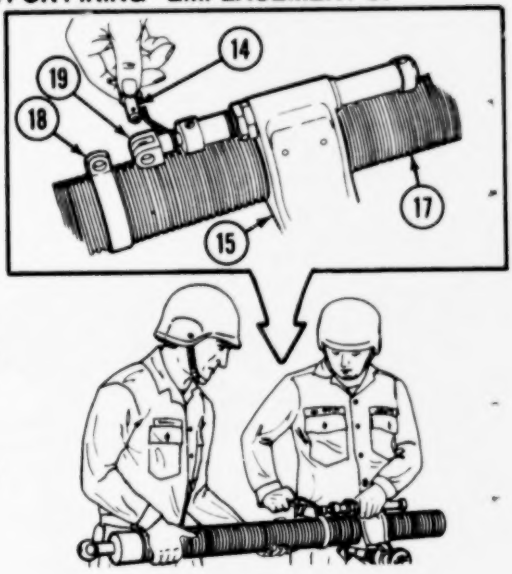
ASSEMBLY AND PREPARATION FOR FIRING - EMPLACEMENT OF MORTAR - Continued.

WARNING

Dented barrels must be replaced as they are unsafe for firing.

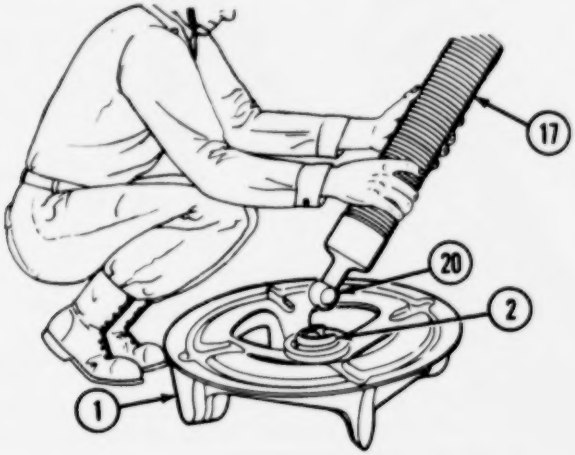
16 Insert the barrel (17) (barrel ring (18) up and centered between the two white lines) into the yoke assembly (15). If there are no graduation marks on barrel, see page 3-13. Use a slight twisting motion until the lug on the barrel ring (18) fits into the rod end clevis (19).

17 Lock the rod end clevis (19) to the barrel ring (18) with the clevis locking pin (14).

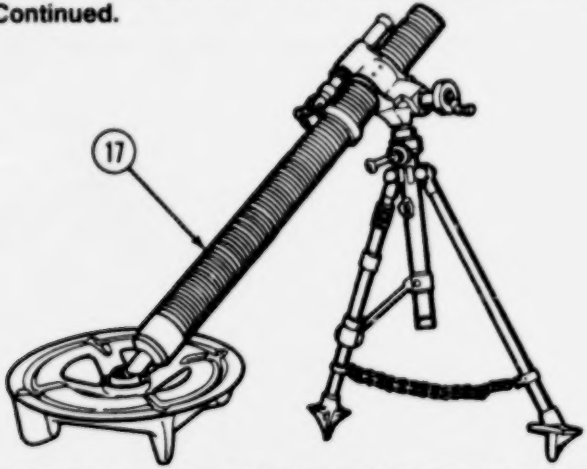


18 Insert the round projection of base cap (20) into the U-shaped opening in the baseplate socket (2).

19 Rotate the barrel (17) one-quarter turn either way to lock it in baseplate (1). Barrel is now seated.



ASSEMBLY AND PREPARATION FOR FIRING - EMPLACEMENT OF MORTAR - Continued.



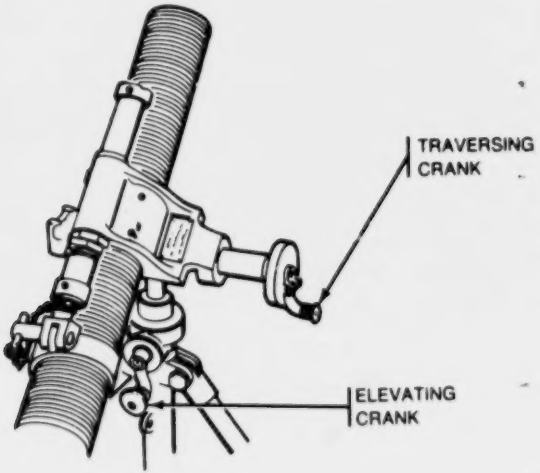
20 During night operation, cannon may be alined to seat in baseplate by rotating barrel (17) until beginning of thread at end of barrel at muzzle is 90 degrees to the left or right. Then turn cannon 90 degrees to the left or right to lock barrel.

NOTE

When required to emplace and fire the mortar on a solid surface:

- Place two additional bags of sand or earth on top of the baseplate on each side of the cannon for safety.
- Emplace bipod feet into bags of sand or earth for stability, if required.

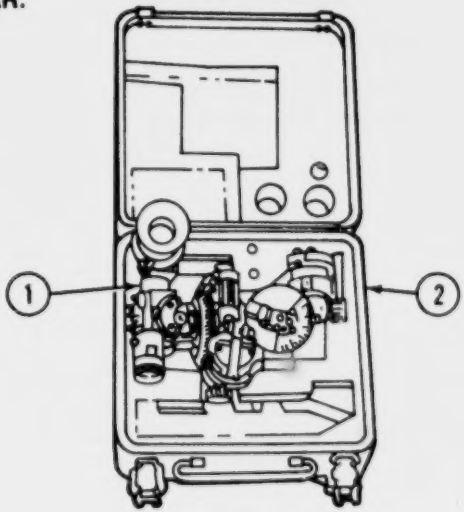
ASSEMBLY AND PREPARATION FOR FIRING - EMPLACEMENT OF MORTAR - Continued.



21 Operate the mortar through entire traverse and elevation ranges.

ASSEMBLY AND PREPARATION FOR FIRING - INSTALLATION OF SIGHTUNIT M53 SERIES ON MORTAR.

1 Remove sightunit (1) from carrying case M166 (2).

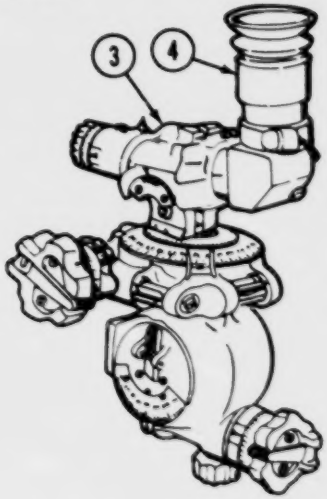


ASSEMBLY AND PREPARATION FOR FIRING - INSTALLATION OF SIGHTUNIT M53 SERIES ON MORTAR - Continued.

2 Loosen telescope locking clamp (3).

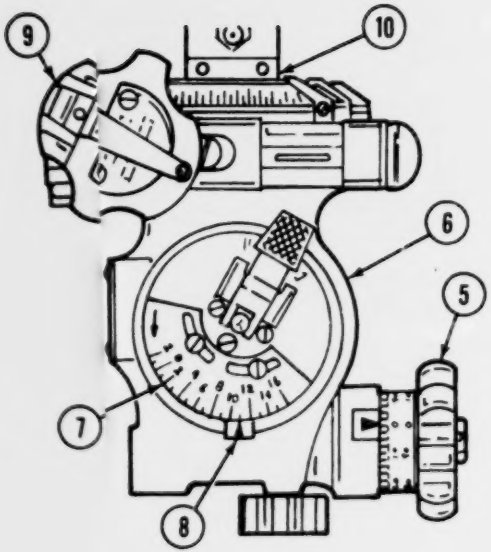
3 Turn elbow telescope M109 (4) to vertical position. Aline indexing lines.

4 Lock into position.



5 Rotate the elevation knob (5) on telescope mount (6) to aline the 800-mil graduation on coarse elevation scale (7) with elevation reference pointer (8).

6 Rotate deflection (azimuth) knob (9) to set red deflection scale (10) on 3200 mils. If it can't be set, refer to troubleshooting on page 3-6.

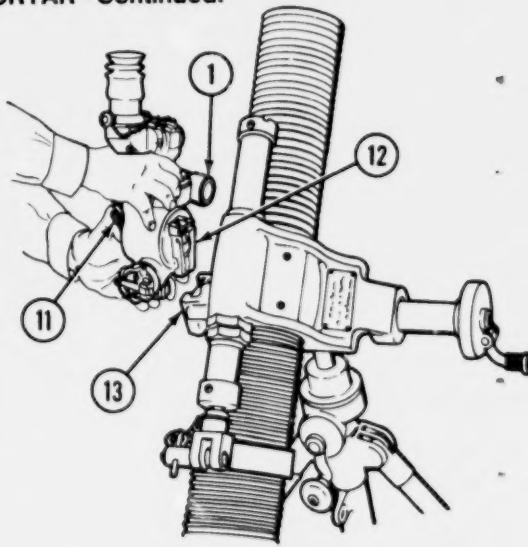


ASSEMBLY AND PREPARATION FOR FIRING - INSTALLATION OF SIGHTUNIT M53 SERIES ON MORTAR - Continued.

7 Press and hold down locking latch (11).

8 Install sightunit (1) on mortar by inserting dovetail (12) into sight socket (13) on mortar.

9 Release locking latch (11) when sightunit is fully seated.



ASSEMBLY AND PREPARATION FOR FIRING - INSTALLATION OF INSTRUMENT LIGHT M53E1 FOR NIGHT OPERATION.

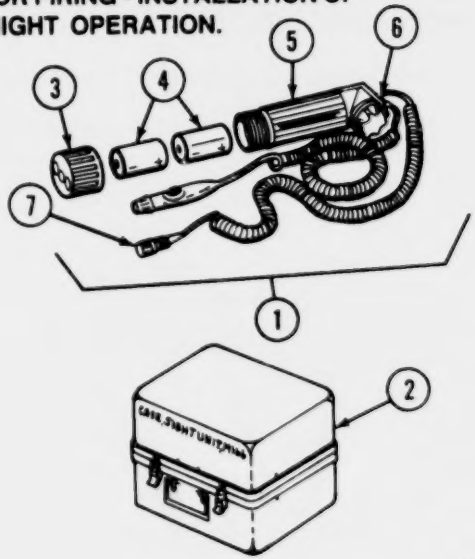
1 Remove instrument light M53E1 (1) from sightunit carrying case M166 (2).

2 Remove battery case cap (3).

3 Insert two BA-30 or BA-3030 batteries (4) (item 2 or 3, app D) into battery case (5) and replace cap (3).

4 Check operation of rheostat knob (6) and also note strength of batteries by intensity of light produced.

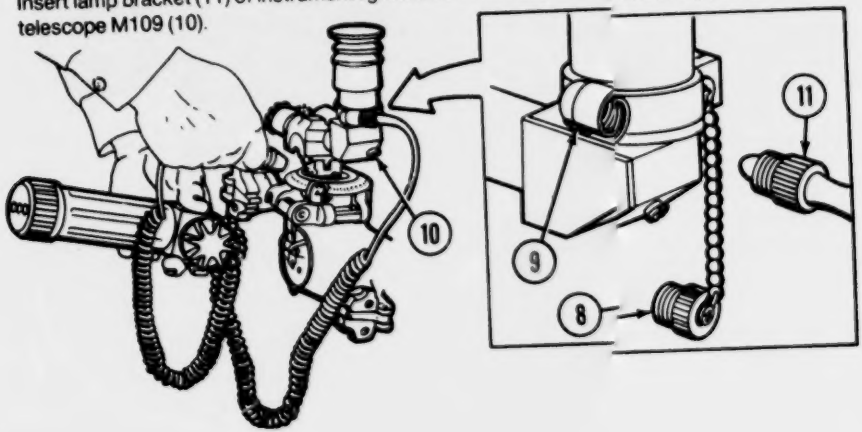
5 Remove dust cap (7) on instrument light M53E1.



ASSEMBLY AND PREPARATION FOR FIRING - INSTALLATION OF INSTRUMENT LIGHT M53E1 FOR NIGHT OPERATION - Continued.

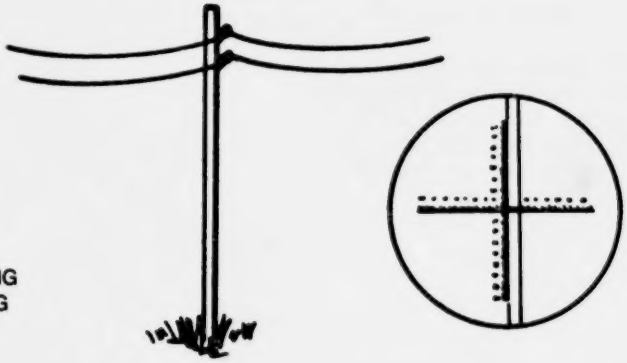
6 Remove dust cover (8) from lamp bracket holder (9) of elbow telescope M109 (10).

7 Insert lamp bracket (11) of instrument light M53E1 into lamp bracket holder (9) on elbow telescope M109 (10).



ASSEMBLY AND PREPARATION FOR FIRING - BORESIGHTING WITH SIGHTUNIT M53 SERIES.

NOTE
ALWAYS SIGHT ALONG LEFT EDGE OF AIMING POINT.



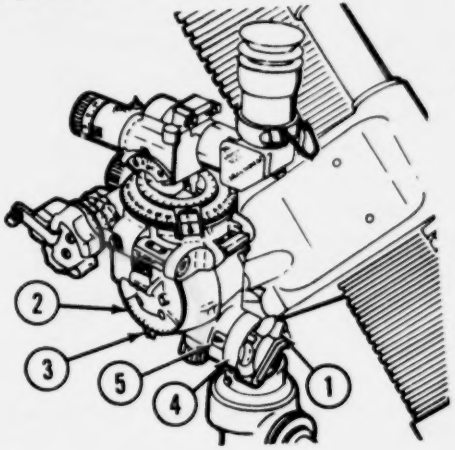
1 Select an aiming point that has clearly defined vertical lines at a distance of at least 200 meters.

ASSEMBLY AND PREPARATION FOR FIRING - BORESIGHTING WITH SIGHTUNIT M53 SERIES - Continued.

NOTE

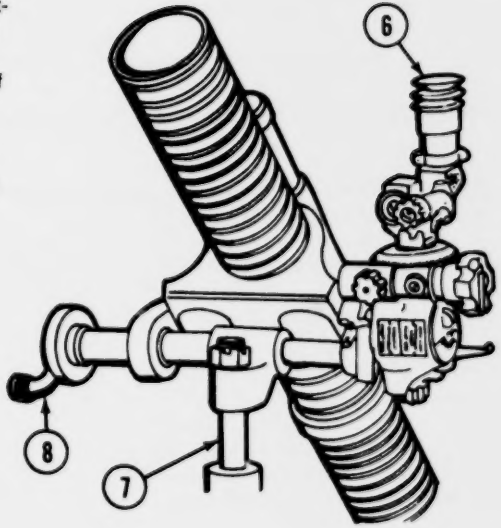
For detailed information on boresighting, refer to FM 23-90.

2 Turn elevation knob (1) until 800 mils on the coarse scale (2) is alined to reference mark (3) on housing and zero on the elevation micrometer scale (4) is alined to reference mark (5) on housing.



3 Aline vertical crossline of sightunit (6) on aiming point by shifting the bipod (7). If necessary, turn traversing crank (8) but keep the mortar within two turns of center of traverse.

4 Make a visual check of mortar for cant. Remove cant, if present, and re-lay mortar.



ASSEMBLY AND PREPARATION FOR FIRING - BORESIGHTING WITH SIGHTUNIT M53 SERIES - Continued.

NOTE

Steps 5 through 19 contain procedures for elevation setting.

5 Install boresight M45 (9) on top of mortar tube as shown, approximately 1 inch from end of muzzle.

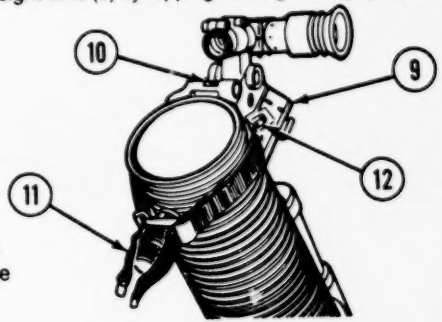
6 Center cross-level vial (10) bubble of boresight M45 (9) by tapping boresight body lightly from side to side with your knuckles.

NOTE

If necessary, clamp screw (11) may be loosened.

7 Tighten clamp screw (11) when bubble centers.

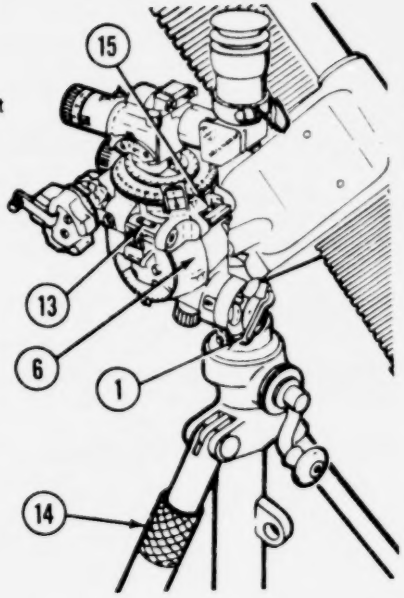
8 Elevate mortar tube until boresight elevation level vial (12) bubble is centered. Tube will then be set at 800 mils elevation.



9 Turn elevation knob (1) until elevation level bubble (13) is centered.

10 Cross-level sightunit (6) by rotating adjusting nut assembly (14) to center bubble in cross-level vial (15).

11 Recheck all level bubbles.



ASSEMBLY AND PREPARATION FOR FIRING - BORESIGHTING WITH SIGHTUNIT M53 SERIES - Continued.

12 Coarse elevation scale (16) reading should be 800 mils.

13 Elevation micrometer scale (4) reading should be 0.

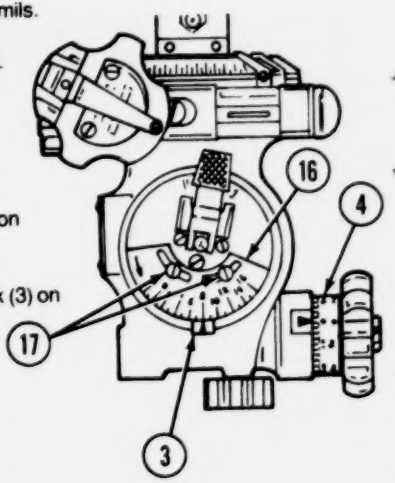
NOTE

If no adjustment is needed, go to step 20.
If adjustment is needed, go to step 14.

14 Loosen two screws (17) which hold coarse elevation scale (16).

15 Slip scale until 800-mil mark meets reference mark (3) on housing.

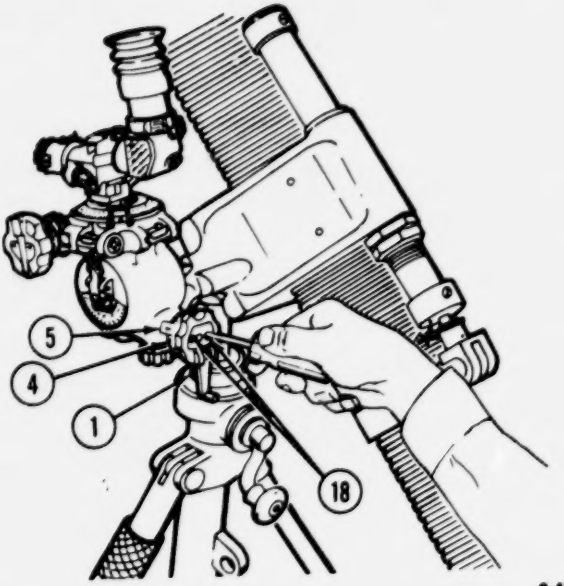
16 Tighten two screws (17) to hold scale.



17 Loosen two screws (18) in elevation knob (1).

18 Slip elevation micrometer scale (4) until 0 mark on micrometer scale meets the reference mark (5) on housing.

19 Tighten two screws (18) to hold elevation micrometer scale (4). Recheck all level bubbles.

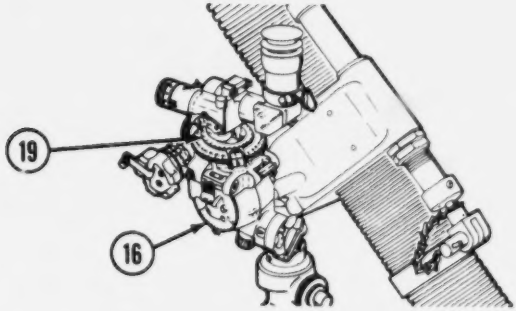


ASSEMBLY AND PREPARATION FOR FIRING - BORESIGHTING WITH SIGHTUNIT M53 SERIES - Continued.

NOTE

Steps 20 through 39 contain procedures for deflection setting.

20 Check again to be sure that sightunit settings read 3200 mils on coarse deflection (azimuth) fixed scale (RED) (19) and 800 mils on coarse elevation scale (16). Repeat steps 5 through 19 if necessary.

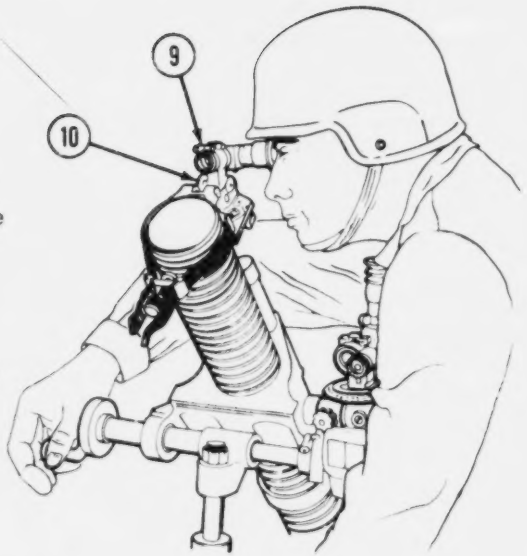


NOTE

If mortar is alined on the aiming point at the beginning of boresighting, it will take less traversing to aline crossline on aiming point.

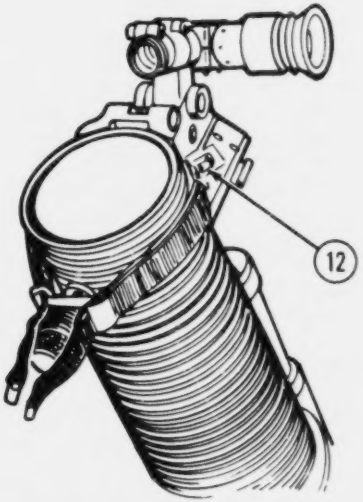
21 By traversing mortar no more than two turns of center of traverse, aline vertical crossline of boresight M45 (9) on original aiming point.

22 Recheck boresight cross-level vial (10) bubble. Adjust as necessary, as the mortar may cant as the mortar is traversed.

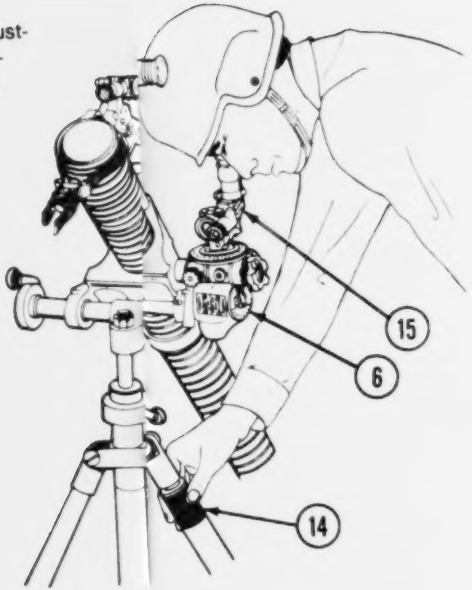


ASSEMBLY AND PREPARATION FOR FIRING - BORESIGHTING WITH SIGHTUNIT M53 SERIES - Continued.

23 Recheck that M45 boresight elevation level vial (12) bubble is centered. Adjust as necessary by elevating or depressing mortar tube.



24 Level sightunit (6) by turning adjusting nut assembly (14) until cross-level vial (15) bubble is centered.



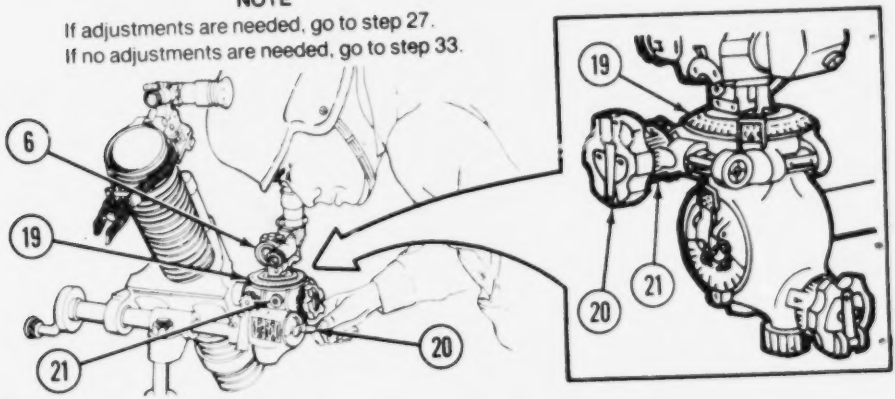
ASSEMBLY AND PREPARATION FOR FIRING - BORESIGHTING WITH SIGHTUNIT M53 SERIES - Continued.

25 Turn deflection (azimuth) micrometer knob (20) until sightunit (6) crossline is alined on aiming point.

26 Check that coarse deflection (azimuth) fixed scale (RED) (19) reads 3200 mils and fixed deflection micrometer (azimuth) scale (RED) (21) reads zero.

NOTE

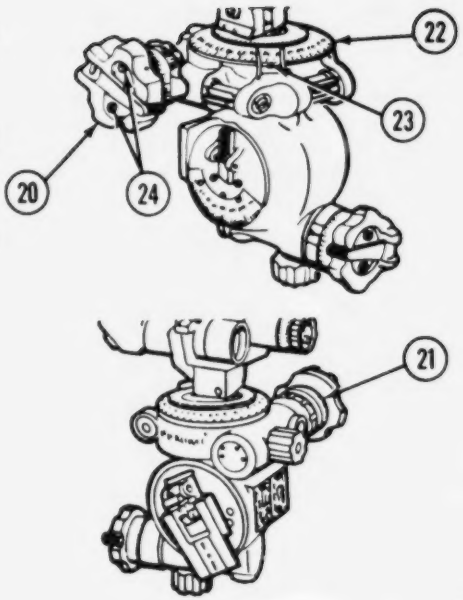
If adjustments are needed, go to step 27.
If no adjustments are needed, go to step 33.



27 Push down on coarse deflection slip scale (BLACK) (22) and turn until 3200 is alined with index (23). Then release.

28 Loosen two boresight locking screws (24) in deflection (azimuth) micrometer knob (20).

29 Slip fixed deflection micrometer (azimuth) scale (RED) (21) until the 0 mark on micrometer scale is alined with (RED) index arrow.

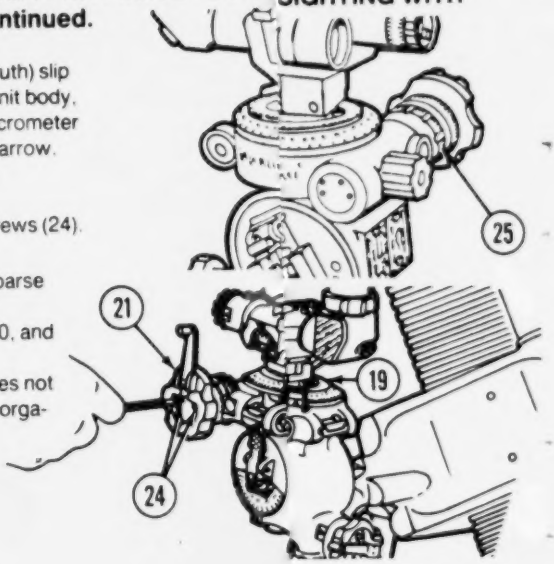


ASSEMBLY AND PREPARATION FOR FIRING - BORESIGHTING WITH SIGHTUNIT M53 SERIES - Continued.

30 Push micrometer deflection (azimuth) slip scale (BLACK) (25) toward sightunit body, then turn it until the O mark on micrometer scale is alined with BLACK index arrow. Then release.

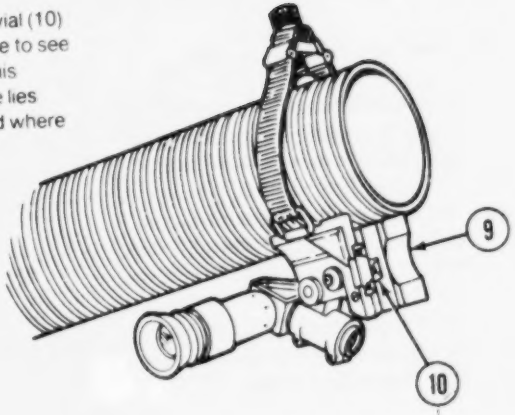
31 Tighten two boresight locking screws (24).

32 If, after these adjustments, the coarse deflection (azimuth) fixed scale (RED) (19) still does not read 3200, and the fixed deflection micrometer (azimuth) scale (RED) (21) still does not read zero, turn the sightunit in to organizational maintenance.



33 To verify boresight alinement, remove and place boresight M45 (9) in position underneath the mortar tube as shown.

34 Center boresight M45 (9) cross-level vial (10) bubble and check the vertical crossline to see if it is still on the aiming point. If not, this indicates that the true axis of the bore lies halfway between the aiming point and where the boresight is now pointing.



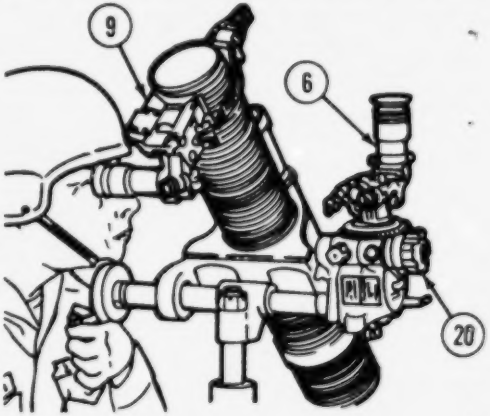
ASSEMBLY AND PREPARATION FOR FIRING - BORESIGHTING WITH SIGHTUNIT M53 SERIES - Continued.

35 To correct the error, look through boresight M45 (9) and traverse mortar onto aiming point.

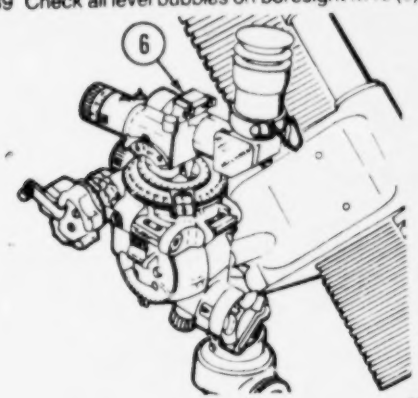
36 Check all level bubbies.

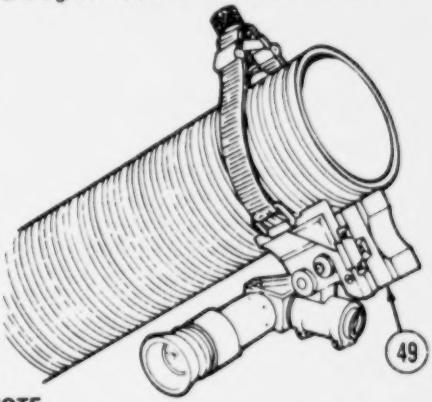
37 Turn deflection (azimuth) micrometer knob (20) to place vertical crossline of sightunit (6) back onto aiming point.

38 With sightunit (6) in this position, the deflection micrometer scales (RED and BLACK) should be slipped to eliminate one-half the error shown on them. (See steps 28 through 31.) For example, If the mil variation is 10 mils, then one-half of this value is 5 mils.



39 Check all level bubbles on boresight M45 (9) and sightunit (6) to make sure they are centered.



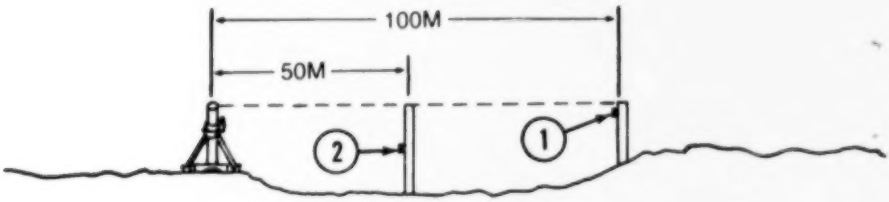


NOTE

Mortar is now boresighted. Repeat boresighting procedure starting on page 2-41 if there are any errors.

40 Remove boresight M45 (9). Store boresight in carrying case.

OPERATING PROCEDURES - EMPLACING AIMING POSTS FOR INDIRECT FIRE.



1 Place two sets of assembled aiming posts in ground in a line at a referred deflection from direction of fire. The far post should be emplaced first, 100 meters from weapon where possible. Emplace near post halfway between far post and weapon.

2 If required, place an aiming post light on each post. Far post light (1) should be visible above near light (2).

OPERATING PROCEDURES - OPERATION OF SIGHTUNIT M53 SERIES.

NOTE

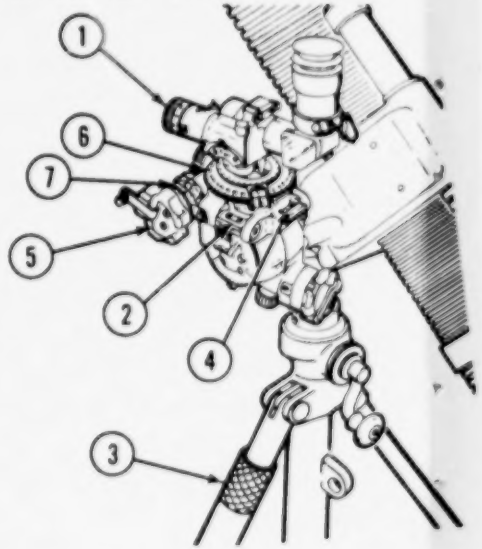
- Aiming posts M1A2 are in position during initial laying procedure. If required, aiming post lights M14 are used with aiming posts.
- Instrument light M53E1 illuminates reticle and scales, and hand light illuminates levels, scales, and micrometer of sightunit M53 series.
- Plotting board M16 is a portable instrument used to geometrically compute the range and azimuth to target from mortar. Refer to TM 9-1220-243-12&P for more information about the plotting board.
- Tube remains at 800 mils following boresighting (p 2-41).

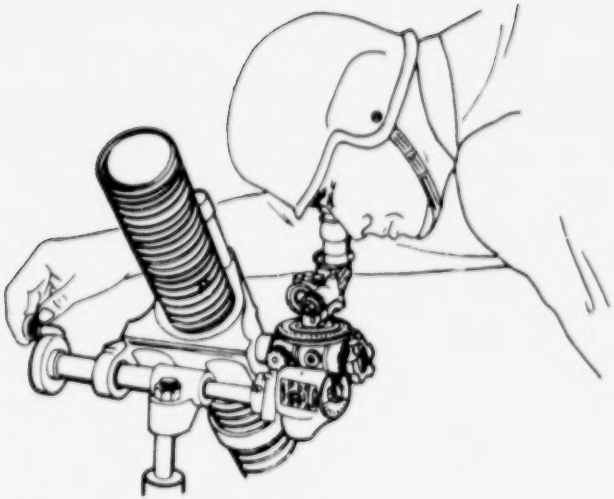
OPERATING PROCEDURES - OPERATION OF SIGHTUNIT M53 SERIES - Continued.

1 Rotate angle-of-sight knob (1) so aiming posts can be seen.

2 Cross-level sightunit (2) by rotating adjusting nut assembly (3) to center bubble in cross-level vial (4).

3 Rotate deflection (azimuth) micrometer knob (5) to set firing deflection on coarse deflection (azimuth) fixed scale (RED) (6) and micrometer deflection (azimuth) slip scale (BLACK) (7).

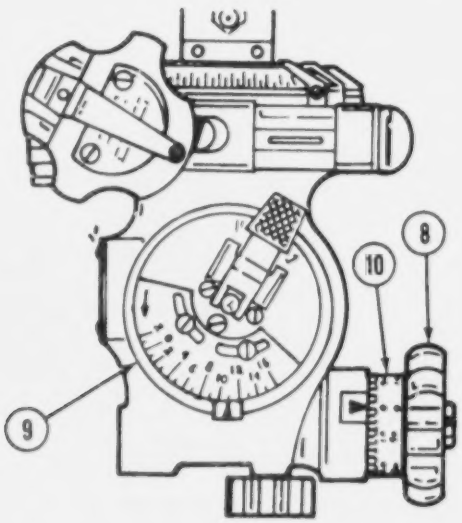




4 Traverse mortar so vertical line of sightunit reticle pattern is alined with aiming posts.

OPERATING PROCEDURES - OPERATION OF SIGHTUNIT M53 SERIES - Continued.

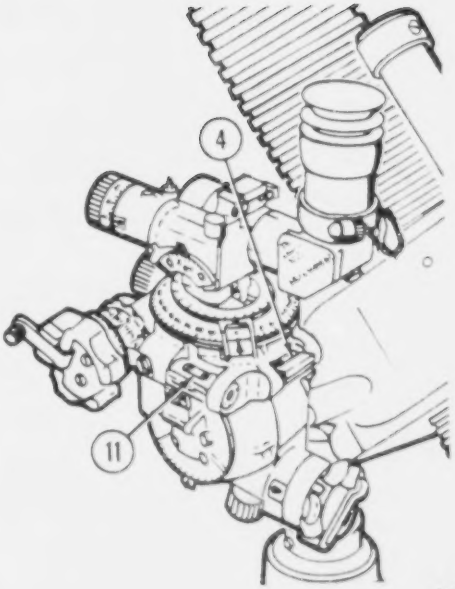
5 Rotate elevation knob (8) to set elevation on coarse elevation scale (9) and elevation micrometer scale (10).



6 Elevate mortar so bubble is centered in elevation level vial (11).

7 Be sure that:

- Bubble centers in cross-level vial (4) of sightunit.
- Vertical line of reticle pattern alines with aiming posts.
- Bubble centers in elevation level vial (11).



2-63

OPERATING PROCEDURES - LOADING AND FIRING.

WARNING

- Double loading of mortar ammunition has resulted in catastrophic accidents. Loading a mortar weapon with two men (alternately) can be very dangerous and could prove fatal. Even with one-man loading, double loading can occur. This is especially true in rapid fire exercises. For this reason, it is imperative that there be absolute certainty that the previous round left the mortar tube before a new round is dropped in.
- Upon releasing cartridge, pass hands downward and, at the same time, turn away from muzzle of mortar cannon to avoid blast which occurs when cartridge fires. This places the assistant gunner in position to accept the next cartridge.
- Do not try to force a cartridge down mortar cannon.
- Dented barrels must be replaced, as they are unsafe for firing.
- In case of misfire, refer to misfire procedures on page 2-66.
- Mortar crew is required to use single hearing protection during firing.

WARNING

ALLOWABLE NUMBER OF ROUNDS PER DAY (ANOR)*

To reduce hazards from blast overpressure during firing, the mortar crew is required to use hearing protection. Using the proper head position and single hearing protection, the ANOR that can be fired each day are noted below.

800 SERIES AMMUNITION

CHARGE	ELEVATION	ANOR
3	800	180
3	1156	152
3	1511	>1000

300 SERIES AMMUNITION

CHARGE	301	374/375
4	50	**
8	143	--
9	--	125

*For training only, does not apply in combat.
**For M374A3/M375A3 series ammunition, ANOR = 106.

WARNING

The M800 Series Cartridges (M821 HE, M889 HE, M819 Smoke (RP), M853A1 Illum and M879 TP) are NOT to be fired above Charge 3. The M821 and M889 may be fired at Charge 3 ONLY in a combat emergency. Firing of the M821 and M889 for training purposes is limited to Charge 2. Firing above Charge 3 can cause SEVERE damage to the mortar and SEVERE injury to the crew.

CAUTION

- In case of misfire, remove sightunit until there is no danger of the sightunit becoming damaged from the recoil of the mortar.

NOTE

- As a precautionary measure during training, dry swab the bore of the cannon before firing and after every ten rounds fired.

LOADING

1 Hold cartridge body near center.

2 Insert cartridge into barrel (fin end first).

3 Release cartridge. Cartridge will slide down barrel under its own weight, strike firing pin at bottom, and fire.

LOG BOOK ENTRIES AFTER FIRING

1 After firing has been completed for the day, enter the rounds fired on DA Form 2408-4.

2 No entry need be made in columns e, g, and h of DA Form 2408-4.

OPERATING PROCEDURES - MISFIRE.

NOTE

A misfire is a failure to fire after cartridge is dropped into mo tar cannon. Misfires may be caused by defective ammunition, damaged firing pin or an obstruction in bore that prevents cartridge from sliding down and striking p in.

MISFIRE

1 If you have a misfire, any crew member shouts "MISFIRE."

2 All personnel, except the gunner, move a safe distance from the rear of the mortar.

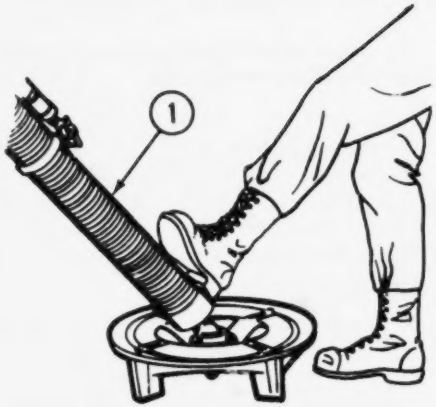
WARNING

If the following procedure does not cause the cartridge to fir and the mortar is hot, wait until the mortar is cool enough to move with bare h nds. If the mortar is cool enough at time of misfire, wait 1 minute before removin the cartridge. Water or snow applied to the outside of the barrel can be used for c ooling. This is to avoid an accident from possible delayed action of the ignitior cartridge.

3 When a misfire happens, the gunner stands behind the mortar and strikes the barrel (1) several sharp blows with the heel of his boot. After kicking the barrel, the gunner moves to where the rest of the crew is and waits for 1 minute.

4 If cartridge fires, the mortar is re-laid and firing is continued. If time permits, swab bore before firing is continued to remove any debris that may have caused the misfire.

5 If cartridge does not fire, see Cartridge Removal Procedures on page 2-68.



OPERATING PROCEDURES - MISFIRE - Continued.

CARTRIDGE REMOVAL PROCEDURES

6 The gunner checks the barrel for heat and announces when the barrel is cool enough to begin cartridge removal procedures.

CAUTION

Sightunit M53A1 or M53 must be removed before continuing misfire procedures.

7 Lock sightunit knobs on last deflection and place in carrying case.

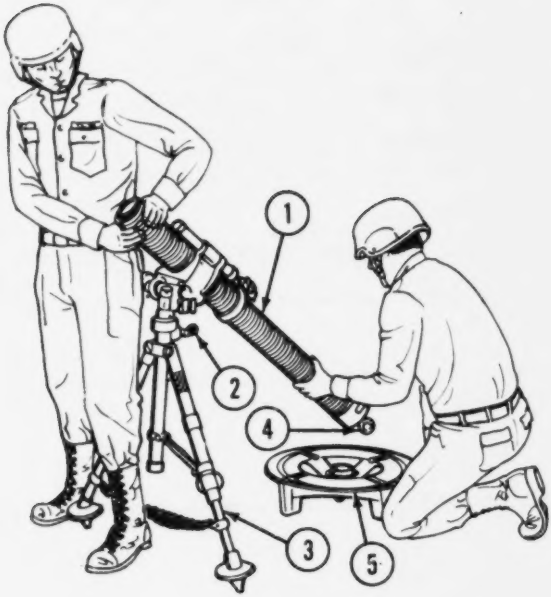
8 The gunner depresses the barrel (1) to the minimum elevation using elevating handwheel (2) making sure that the handwheel isn't turned far enough to lock.

WARNING

Keep body and head away from the front of the mortar.

9 The assistant gunner braces the right leg of the bipod (3) by placing his left leg in front of it.

10 The gunner rotates the barrel (1) until the base cap (4) is unlocked from the baseplate (5).


1
2
3
4
5

OPERATING PROCEDURES - MISFIRE - Continued.

WARNING

The assistant gunner places the thumbs of both hands alongside the forefingers and keeps both hands completely away from the muzzle.

11 The assistant gunner then places his right hand, palm up, under the barrel (1) near the muzzle. He then places his left hand, palm down, on top of the barrel (1).

WARNING

Gunner must not put his hand on base cap when lifting and holding barrel.

12 The gunner places his right hand around the barrel ahead of the base cap.

WARNING

Under no circumstances will base cap end of cannon be lowered again below a horizontal position until cartridge has been removed from cannon.

13 The gunner lifts the base of the barrel (1) until it is horizontal.

14 Only after barrel (1) is in the horizontal position does the assistant gunner place the thumb of each hand over the muzzle.

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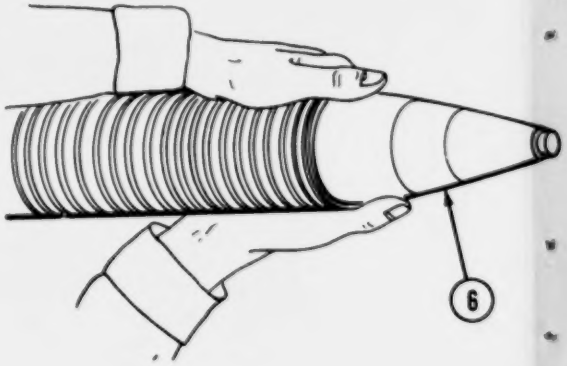
OPERATING PROCEDURES - MISFIRE - Continued.

15 The assistant gunner stops the cartridge (6) with his thumbs without touching the fuze, removes the cartridge, and passes it to the first ammunition handler.

16 If primer is dented, the first ammunition handler replaces the safety wire (if applicable). He then gives it to the officer in charge for disposal. If primer is not dented, the cartridge may be used again.

17 The gunner shakes the barrel to dislodge any remnants from last cartridge fire, locks the barrel in baseplate, and swabs cannon bore (if time permits).

18 The mortar is then re-laid.



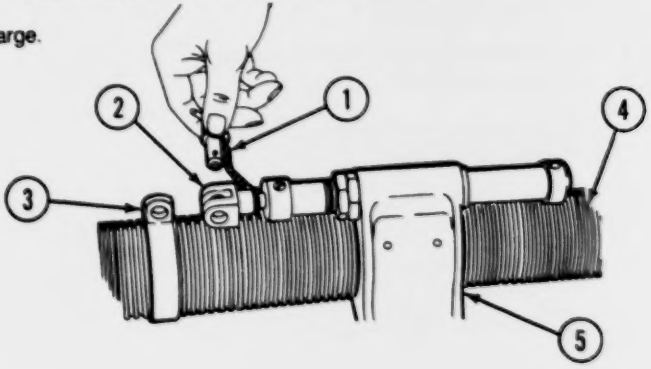
If Cartridge Cannot be Removed from Cannon:

1 Keep barrel in a horizontal position.

2 Remove it from the bipod by disengaging clevis locking pin (1) from rod end clevis (2) and barrel ring (3) and withdrawing cannon (4) from yoke assembly (5).

3 Lay barrel in a dug pit in a horizontal position. Point it in direction of fire.

4 Notify the officer in charge.



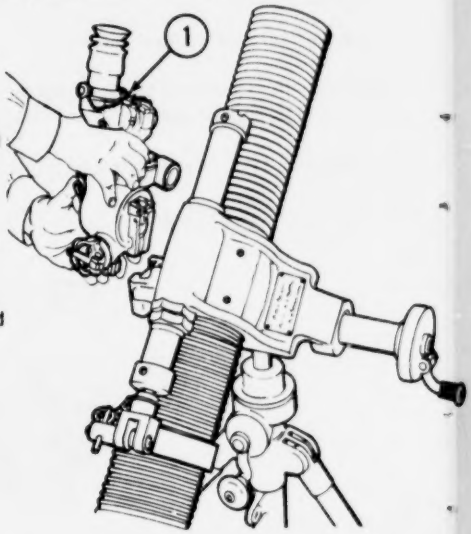
PREPARATION FOR MOVEMENT - DISASSEMBLING MORTAR AND EQUIPMENT.

1 Remove sightunit M53 or M53A1 (1).

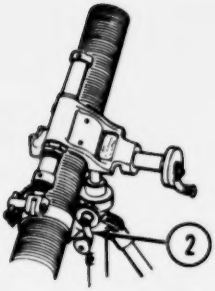
2 Close covers on level assemblies, place an elevation of 800 mils and a deflection of 3800 mils on sightunit, and stow it in sightunit carrying case.

3 Remove instrument light M53E1 and stow in sightunit carrying case.

4 Retrieve aiming posts (and lights, if used) and stow them in their cases.



5 Lower mortar to its minimum elevation by turning elevating crank (2).



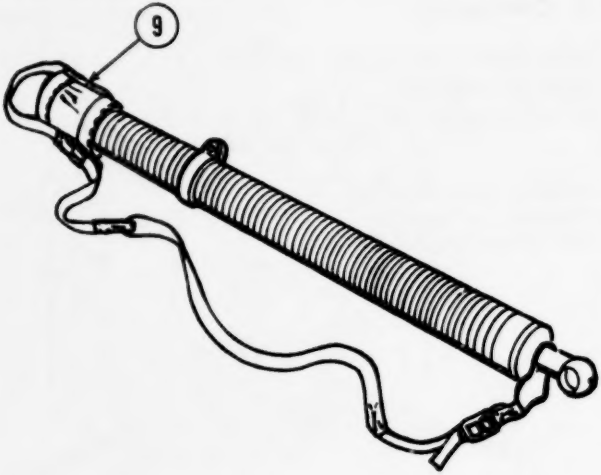
6 Rotate cannon barrel (3) one-quarter turn in baseplate socket (4).

7 Lift cannon from baseplate (5).

PREPARATION FOR MOVEMENT - DISASSEMBLING MORTAR AND EQUIPMENT - Continued.

8 Disengage clevis locking pin from rod end clevis and barrel ring (6) and withdraw cannon (7) from yoke assembly (8).

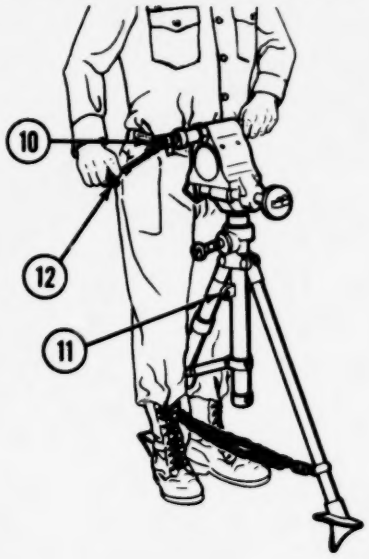
9 Install gun muzzle cover (9) on cannon.



PREPARATION FOR MOVEMENT - DISASSEMBLING MORTAR AND EQUIPMENT - Continued.

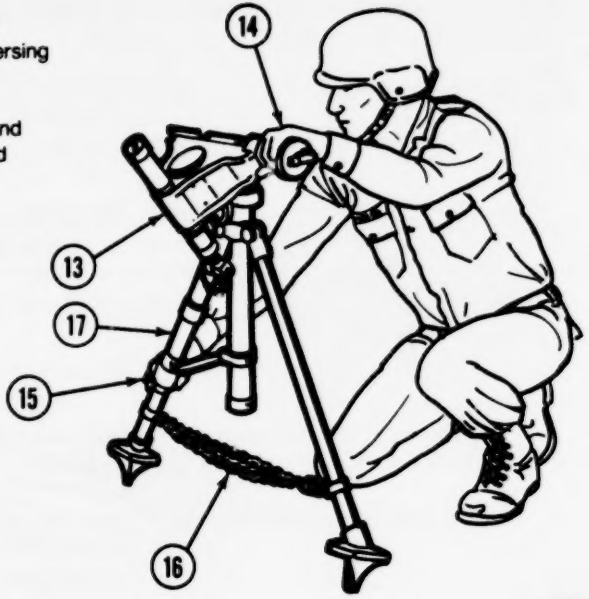
10 Traverse bipod assembly until rod end clevis (10) alines with projecting lug (11) on elevating mechanism assembly.

11 Lock rod end clevis (10) to projecting lug (11) on elevating mechanism assembly with clevis locking pin (12).



12 Kneel on right knee and support bipod (13) with left hand on traversing nut (14).

13 Loosen the locking sleeve (15) and unhook chain (16) from left bipod leg (17).



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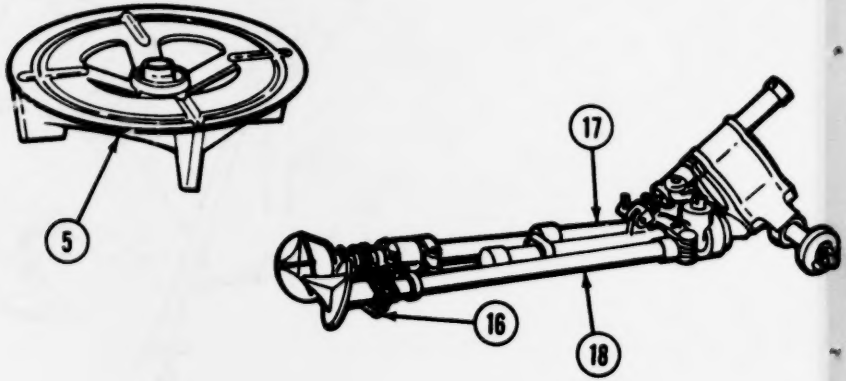
PREPARATION FOR MOVEMENT - DISASSEMBLING MORTAR AND EQUIPMENT - Continued.

14 Close the bipod legs (17 and 18), wrap the chain (16) around the legs, and rehook the chain.

15 Remove baseplate (5) from its emplacement.



Section IV. OPERATION UNDER UNUSUAL CONDITIONS

COLD.

1 Keep ammunition and fire control instruments covered. Do not move fire control instruments from cold to warm areas. Use arctic lubricant.

2 Refer to FM 9-207, FM 31-70, and FM 31-71 for operation in cold climates.

HOT.

1 Lubricate cannon, bipod, and baseplate frequently with general purpose lubricating oil (item 13, app D), paying particular attention to all hidden surfaces such as bore, firing pin, and similar places where corrosion might occur and not be quickly noticed.

2 Clean, wipe dry, and restore oil film after handling. Keep equipment covered.

HOT AND DRY.

Clean and oil the bore of cannon more frequently than usual. Keep equipment covered.

HOT, DAMP, AND SALTY ATMOSPHERE.

1 When mortar is being fired, clean and lubricate the bore and exposed metal surface more frequently than required for normal service and keep covers in place as often as firing conditions permit.

2 When mortar is not being used, cover unpainted surfaces with a film of general purpose lubricating oil (item 13, app D) and keep all covers in place.

3 Check optical instruments for fungus growth.

SAND.

1 Clean and lubricate materiel frequently.

2 When beginning an action in sandy areas:

(a) Remove lubricant from machined surface of cannon, elevating and traversing screw sleeves, and other exposed lubricated parts.

(b) Clean and lubricate all exposed parts after action is over.

MUD.

Never emplace mortar on very soft ground (or swamp).

FROZEN GROUND.

1 Use sandbags to seat baseplate.

2 Use tripods to support the aiming posts.

3 See FM 31-70, FM 31-71, and FM 9-207.

FORDING.

1 Disassemble weapon into major components (page 2-74) and cover the components carefully to protect from water splashes.

2 Watch carefully for water seepage into all parts. This could contaminate the lubricant.

3 If immersion occurs, notify organizational maintenance to schedule disassembly and lubrication of gear housing by direct support maintenance at first opportunity.

Section V. OPERATION OF 81-MM MORTAR M29A1 MOUNTED ON M125A1/A2 CARRIER

GENERAL.

This section is for your use in operating the M29A1 Mortar when mounted in the M125A1/A2 Mortar Carrier. If you don't find an item here, look in FM 23- 90.

The M125A1/A2 Mortar Carrier is a modified M113A1/A2 Personnel Carrier. Its purpose is to provide mobility for the mortar and crew. The major modifications are:

Reinforced rear hull floor
Turntable on which the mortar is mounted
Ammunition and fuze stowage racks
Three-piece folding hatch cover directly above the turntable

MORTAR HATCH COVER OPERATION.

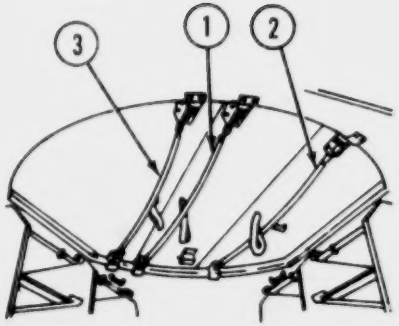
TO OPEN

1 Swing commander's cupola away from hatch cover.

2 Pull on chain (1) to release center section. Fold center section back on right section. Pull on chain (2) to release right section, then push both sections back on top deck.

3 Pull on chain (3) to release left section. Fold back on top deck.

4 Lock hatch sections in the spring-loaded catches on the top deck.



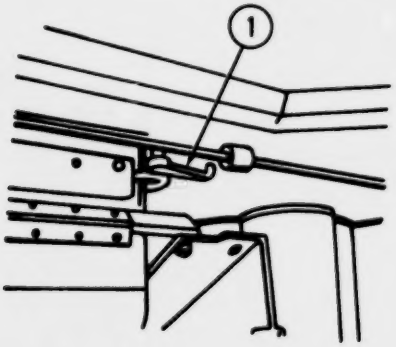
MORTAR HATCH COVER OPERATION.

TO CLOSE

1 Turn left exterior catch handle (1), pull on strap (2), and close left section.

WARNING

Do not turn center section release handle before the right hatch is closed.

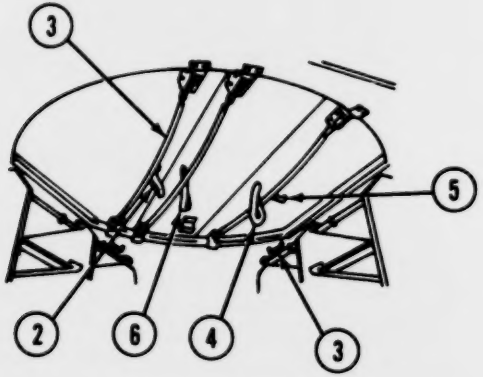


2 Turn right exterior catch handle (3), pull on strap (4), and close right section.

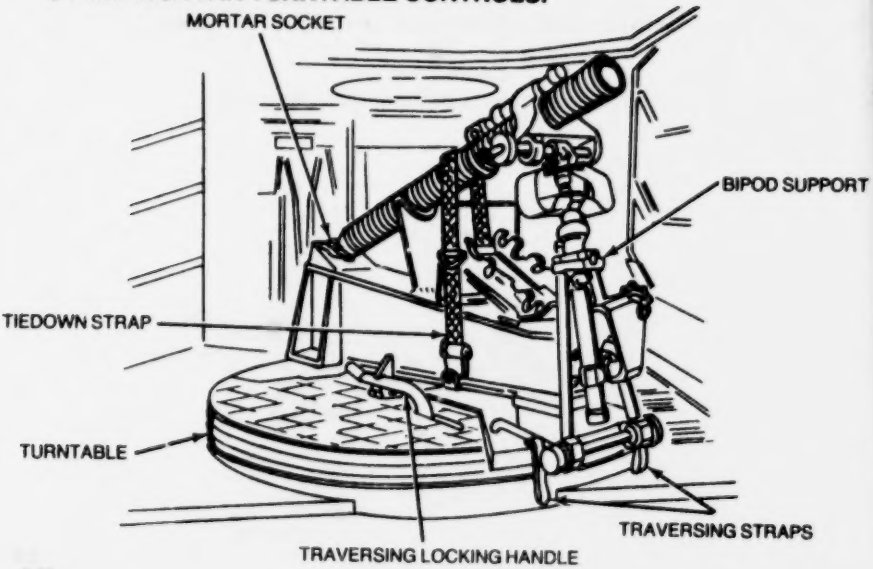
3 Turn center exterior catch handle (5), pull on strap (6), and close center section.

CAUTION

Do not close the sections by pulling down on the chains.



81-MM MORTAR TURNTABLE CONTROLS.



2-88

TURNTABLE

Supports and turns the mortar to the left or right for firing over the sides or the rear.

BIPOD SUPPORT

Retains the mortar cannon in its firing position.

TRAVERSING LOCKING HANDLE

Locks the turntable during firing.

TRAVERSING STRAPS

Moves the turntable when the locking handle is released.

MORTAR SOCKET

Holds the mortar tube at the turntable.

TIEDOWN STRAP

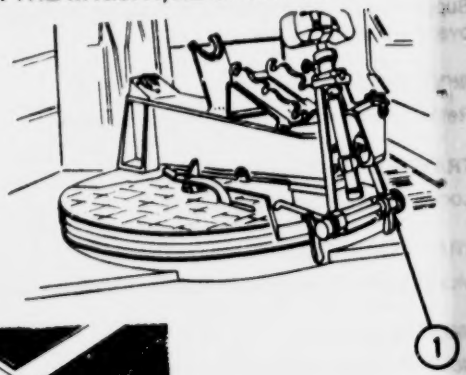
Secures the mortar during travel.

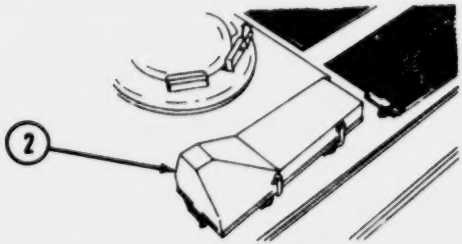
MOUNTING THE 81-MM MORTAR ON THE M125A1/A2 CARRIER.

1 Install bipod assembly in support (1) and push locking handle down to lock it in place (in the travel position).

NOTE

Off-carrier bipod assembly is stowed on top right of carrier and is protected by mortar mount cover (2).

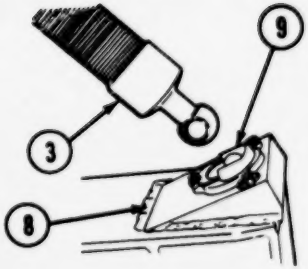


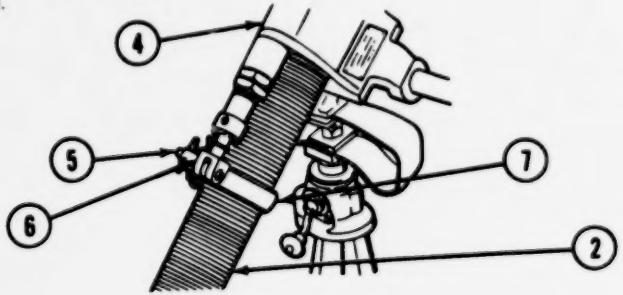


2 Slide mortar barrel (3) through yoke in bipod assembly (4).

3 Secure it by inserting the clevis locking pin (5) through the rod end clevis (6) and barrel ring (7).

4 Insert mortar barrel (3) in mortar base (8) with flat sides of barrel parallel to sides of U-shaped opening in mortar socket (9). Rotate barrel one-quarter turn to lock it in position.

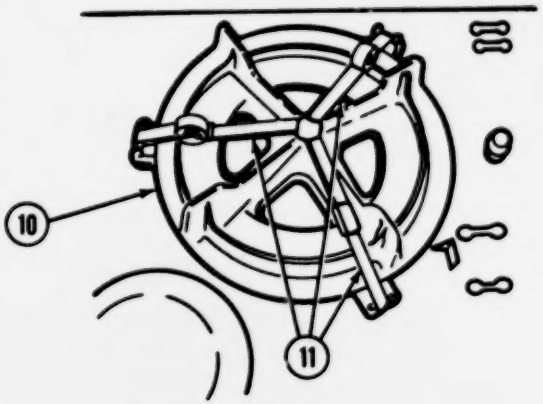




MOUNTING THE 81-MM MORTAR ON THE M125A1/A2 CARRIER - Continued.

NOTE

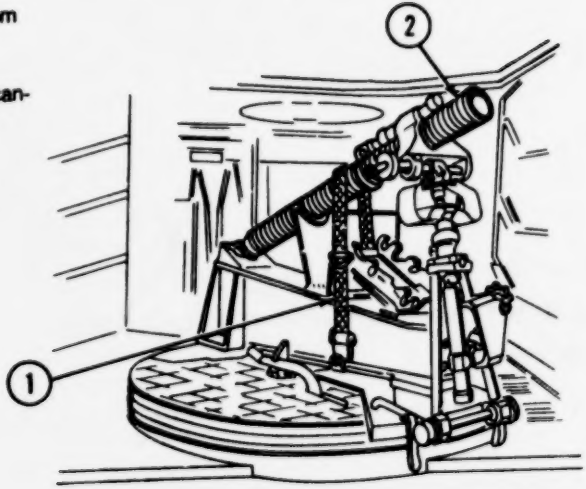
Mortar baseplate (10) is stowed on top left of carrier and is secured by straps (11).



SECURING MORTAR FOR TRAVELING.

1 Remove tiedown strap (1) from mortar equipment bag.

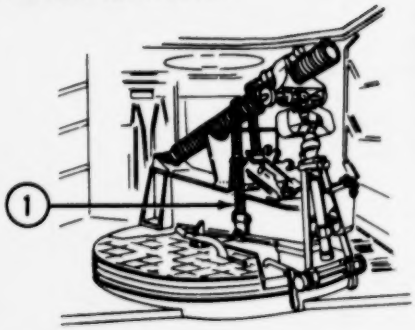
2 Wrap tiedown strap around cannon assembly (2) as shown.



RELEASING MORTAR FOR FIRING OR DISMOUNTING.

1 Remove the mortar tiedown strap (1).

2 Stow tiedown strap in the mortar equipment bag.



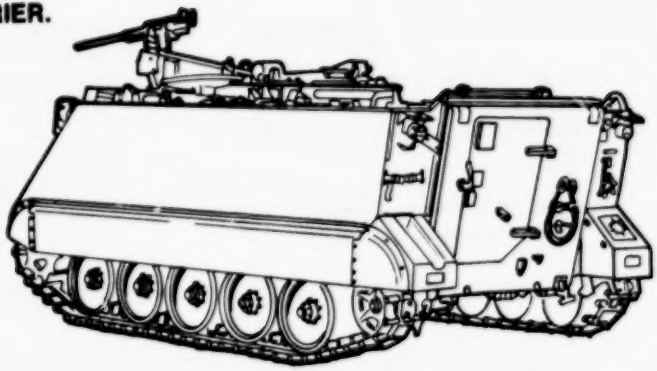
OPERATION OF 81-MM MORTAR ON CARRIER.

GENERAL.

1 Use the instructions of this section 1 through IV, chapter 2, when operating the carrier mounted mortar.

2 Use the maintenance instructions in chapter 3 for the carrier mounted mortar.

FIRING FROM CARRIER.



WARNING

Don't park the carrier near any overhead obstructions that would block the projectile and cause a premature burst. You could get hurt or you could hurt other friendly troops.

1 Park the carrier on ground as firm and level as the tactical situation will permit.

2 Position the carrier so the M29A1 mortar can be moved through the estimated field of fire.

FIRING FROM CARRIER - Continued.

3 Apply and lock the carrier brakes.

4 Position the commander's cupola sideways.

NOTE

Although normally closed, the ramp may be lowered, but only when the tactical situation permits.

5 Open the mortar hatch. Make certain the sections are securely latched in the open position.

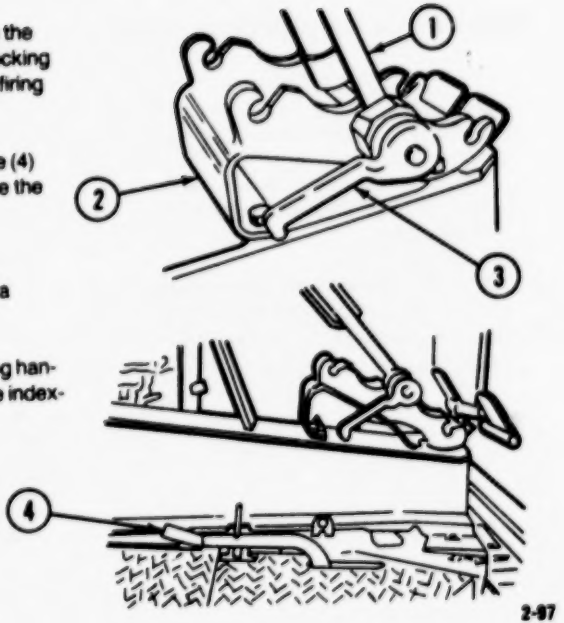
6 Put the bipod (1) in the center slot in the support (2) and push down on the locking handle (3). The mortar is now in the firing position.

7 Unlock the traversing locking handle (4) and pull the traversing strap to move the turntable to the desired setting.

NOTE

The 81-mm mortar can be rotated a full 6400 mils.

8 Push down on the traversing locking handle (4) until it latches securely to the indexing gear.



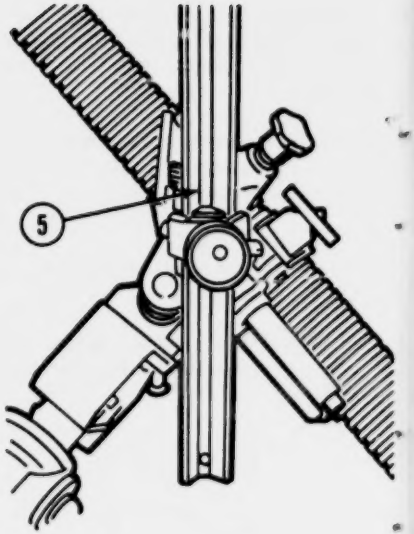
2-97

FIRING FROM CARRIER - Continued.

CAUTION

Do not force the dovetail of the sight extension (5) into the socket of the mortar. If parts do not mate easily, remove the sight extension arm and examine the dovetail and socket for obstructions.

9 Install the sight extension arm (for M53 or M53A1) (5) on the mortar by inserting it into the dovetail on the mortar. Ensure sight extension arm is fully seated.

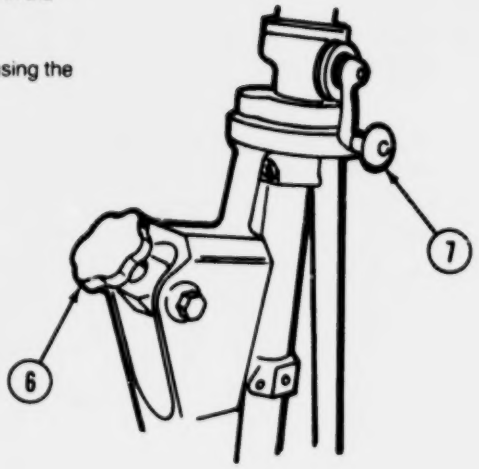


10 Cross-level the bipod assembly using cross-leveling handwheel (6) until the bubble is centered in the sightunit cross-level vial.

. Elevate the mortar to correct the setting using the elevating crank (7).

NOTE

Elevation limits of the mortar are from 700 mils to 1600 mils.

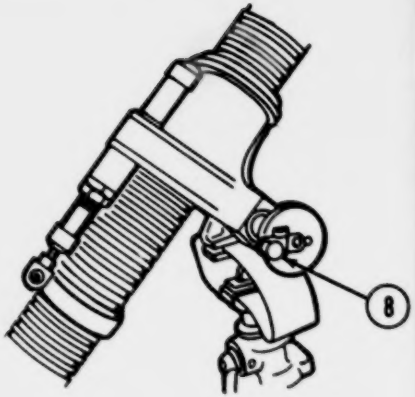


FIRING FROM CARRIER - Continued.

12 Traverse mortar with the traversing crank (8) to the desired setting.

NOTE

The mortar can be traversed 95 mils right or left of the center with the traversing crank.



13 See the table below for elevation and bipod support data.

Bipod assembly support	Barrel ring location	Bipod assembly elevating mechanism	Elevation (degrees approx)	Elevation (mils-approx)
Lower Position:				
Minimum	Raised	Fully depressed	40	712
	Centered	Fully depressed	42	748
	Centered	Fully elevated	66	1,174
Maximum	Lowered	Fully elevated	68	1,208
Center Position:				
Minimum	Raised	Fully depressed	46	819
	Centered	Fully depressed	48	854
	Centered	Fully elevated	75	1,333
Maximum	Lowered	Fully elevated	78	1,388
Upper Position:				
Minimum	Raised	Fully depressed	51 1/2	915
	Centered	Fully depressed	55	979
	Centered	Fully elevated	86	1,520
Maximum	Lowered	Fully elevated	90	1,600

14 For operation of the 81-mm mortar and sighting equipment, see page 2-24.

MISFIRES ON BOARD THE CARRIER.

Cartridge Removal Procedure:

WARNING

If ramp (1) is up during firing and a misfire occurs, the driver remounts the carrier and lowers the ramp after ensuring that it is safe to do so.

1 If there is a misfire, any crew member shouts "MISFIRE."

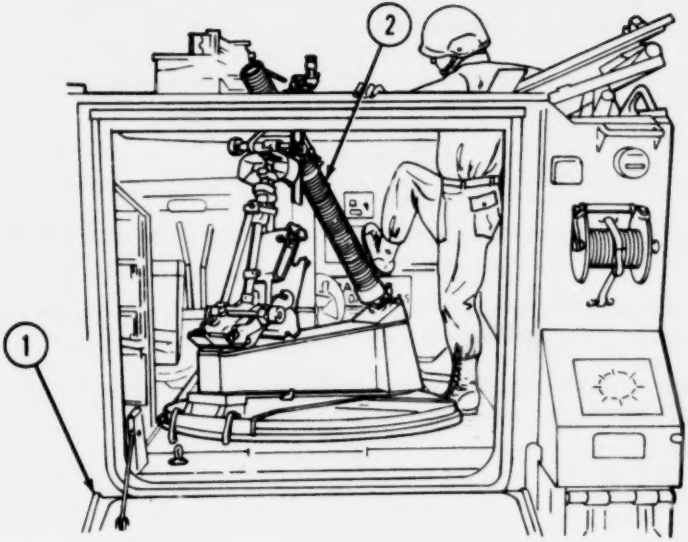
2 The driver and the rest of the crew leave the carrier. Only the gunner remains.

WARNING

If the following procedure does not cause the cartridge to fire and the mortar is hot, wait until the mortar is cool enough to move with bare hands. If the mortar is cool enough at time of misfire, wait 1 minute before removing the cartridge. Water or snow applied to the outside of the barrel can be used for cooling. This is to avoid an accident from possible delayed action of the ignition cartridge.

3 When the crew is clear, the gunner vigorously kicks the mortar barrel (2) to dislodge the cartridge.

4 If cartridge fires, the mortar is re-laid and firing is continued. If time permits, swab the bore before firing is continued to remove any debris that may have caused the misfire.


2
1

MISFIRES ON BOARD THE CARRIER - Continued.

5 If cartridge fails to fire, the gunner dismounts and waits 1 minute.

6 The gunner then remounts and checks the barrel for heat and announces when the barrel is cool enough to remove the cartridge.

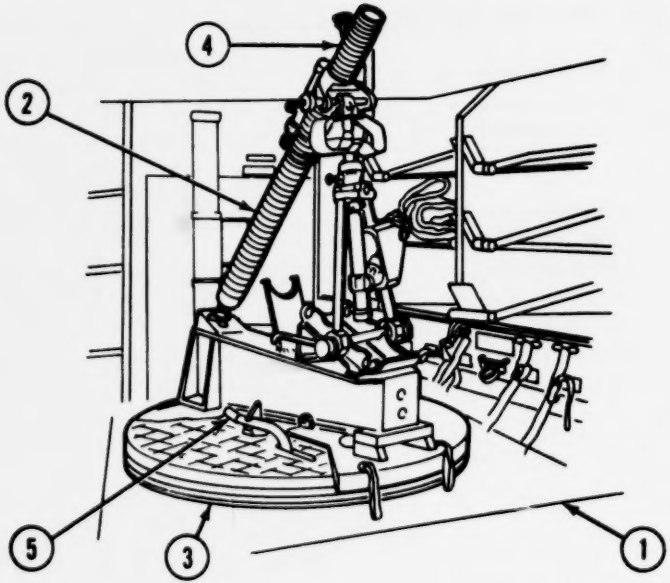
CAUTION

Sightunit must be removed from sight extension before continuing.

7 Gunner locks the sightunit knobs on the last deflection and places the sightunit in the carrying case.

8 The assistant gunner remounts and the gunner and assistant gunner traverse the turntable (3) until the mortar (4) is approximately centered on the rear of the ramp (1) opening.

9 The assistant gunner ensures that the traversing locking handle (5) is locked so the turntable (3) does not move during the removal of the misfire.

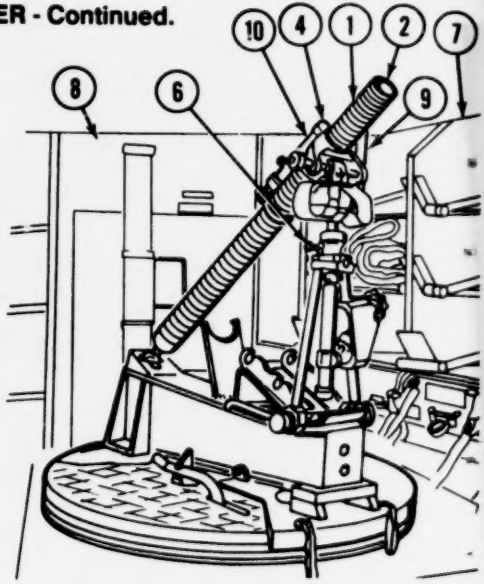


2-105

MISFIRES ON BOARD THE CARRIER - Continued.

10 The gunner depresses the mortar (4) to its lowest elevation by lowering bipod assembly with the elevating crank (6).

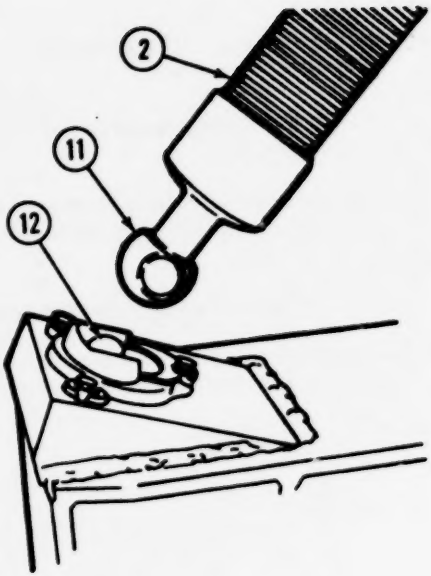
11 He then elevates the mortar (4) 30 turns on the elevating crank (6) so the mortar barrel (2) will clear the rear roof plate (7) of the carrier (8) when the base cap end of the mortar (4) is lifted. The gunner removes the sight extension arm (9).



WARNING

- Do not remove the bipod assembly (10) from the bipod mount any time during removal of a misfire.
- Keep body and head away from the front of the mortar.

12 Without getting behind the mortar, the gunner rotates the mortar barrel (2) a quarter turn to unlock the base cap (11) from the mortar socket (12).



MISFIRES ON BOARD THE CARRIER - Continued.

WARNING

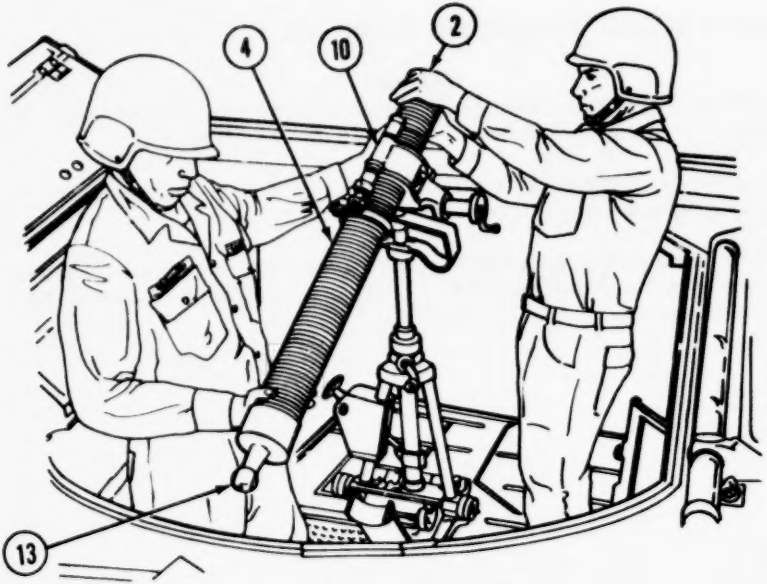
The assistant gunner makes certain that no part of either hand extends over the rim of the muzzle.

13 The assistant gunner stands to the right of the mortar (4) and places his right hand under the mortar barrel (2) near the muzzle and his left hand on top of the barrel.

WARNING

Gunner must not put his hand on base cap when lifting and holding barrel.

14 The gunner places his right hand around the barrel ahead of the base cap (13), and his left hand on the upper portion of the bipod assembly (10).

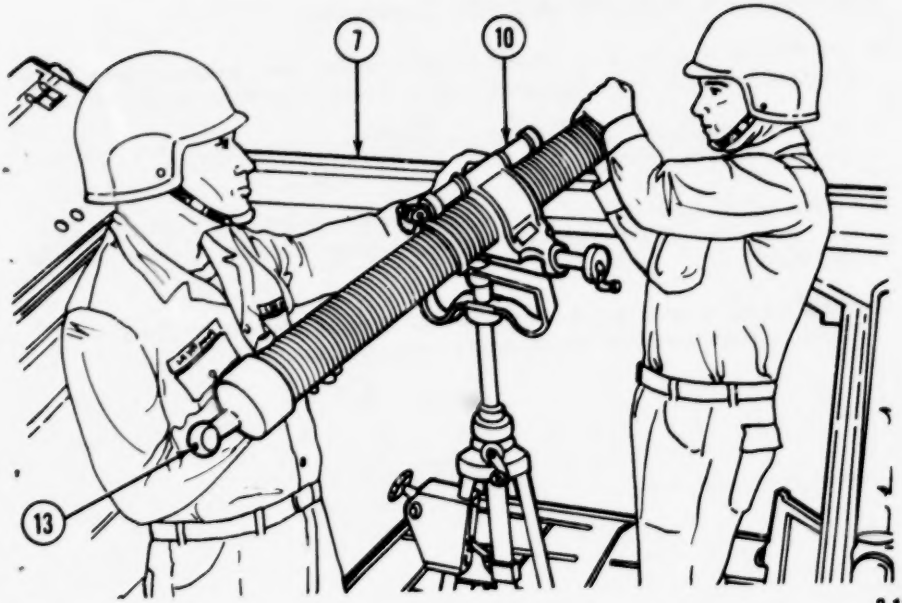

2
4
10
13

MISFIRES ON BOARD THE CARRIER - Continued.

WARNING

- The gunner ensures that the base cap end (13) of the barrel will clear the roof plate (7) of the carrier at the forward edge of the mortar hatch opening.
- Under no circumstances will base cap end (13) of barrel be lowered again below a horizontal position until cartridge has been removed.

15 The gunner carefully lifts the base cap end (13) of the barrel to a horizontal position while pulling back on the bipod assembly (10) to ensure clearance between the muzzle and the roof plate (7) of the carrier.



2-111

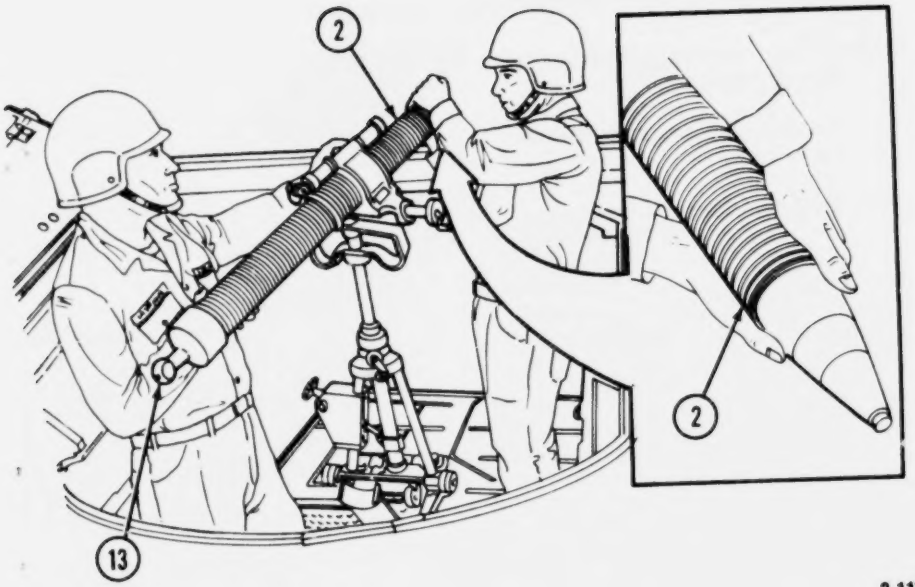
MISFIRES ON BOARD THE CARRIER - Continued.

16 Only after the mortar barrel (2) reaches a horizontal position does the assistant gunner place the thumb of each hand over the muzzle. He stops the cartridge without touching the fuze.

17 The gunner continues to raise the base cap end (13) of the mortar barrel (2). The assistant gunner removes the cartridge.

18 If primer is dented, the first ammunition handler replaces the safety wire (if applicable). He then gives it to the officer in charge for disposal. If primer is not dented, the cartridge may be used again.

19 While the base cap end (13) of the mortar barrel (2) is still in a raised position, the gunner shakes the barrel to dislodge and remove any foreign material.



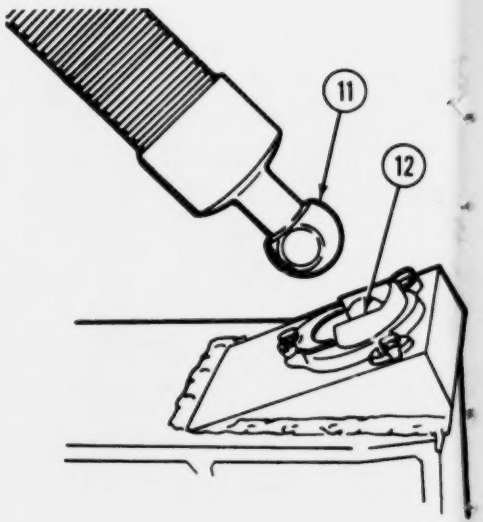
2-113

MISFIRES ON BOARD THE CARRIER - Continued.

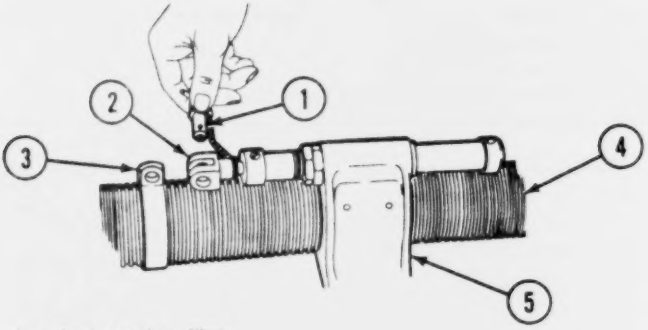
20 The base cap (11) is then placed back into the mortar socket (12).

21 The assistant gunner swabs the bore, if time permits.

22 The gunner re-lays the mortar.



If the Cartridge Cannot be Removed from Cannon:



1 Keep barrel in a horizontal position.

2 Remove barrel from the bipod assembly by disengaging clevis locking pin (1) from rod end clevis (2) and barrel ring (3) and withdrawing cannon (4) from yoke assembly (5).

3 Lay barrel in a dug pit in direction of fire.

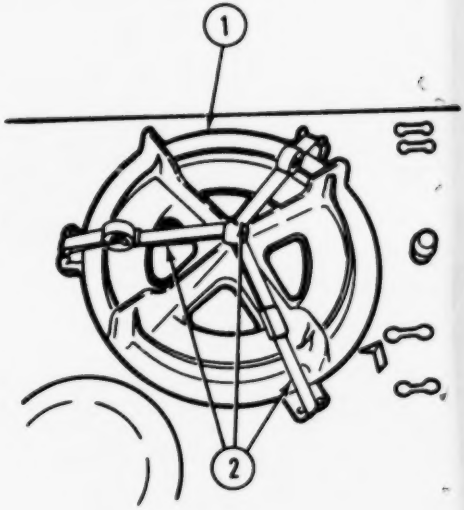
4 Notify the officer in charge.

DISMOUNTING THE MORTAR FROM M125A1/A2 CARRIER.

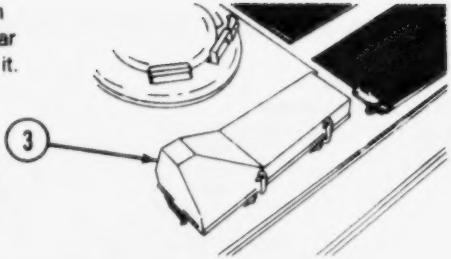
NOTE

After you have dismounted mortar from carrier, see section III for operating instructions and chapter 3 for maintenance instructions.

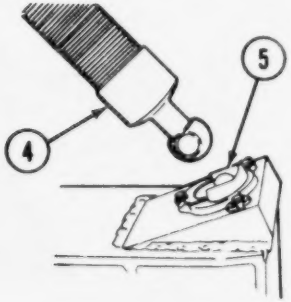
1 Remove off-carrier mortar baseplate (1) from top left of carrier by removing straps (2). Lift mortar baseplate from carrier and set it in position on the ground.



2 Remove off-carrier bipod assembly from top right of carrier by removing the mortar mount cover (3) and the straps securing it.

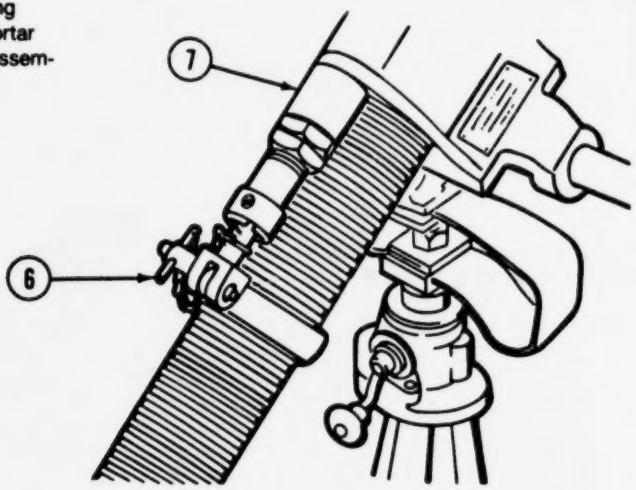


3 Rotate mortar barrel (4) a quarter turn and remove it from mortar socket (5).

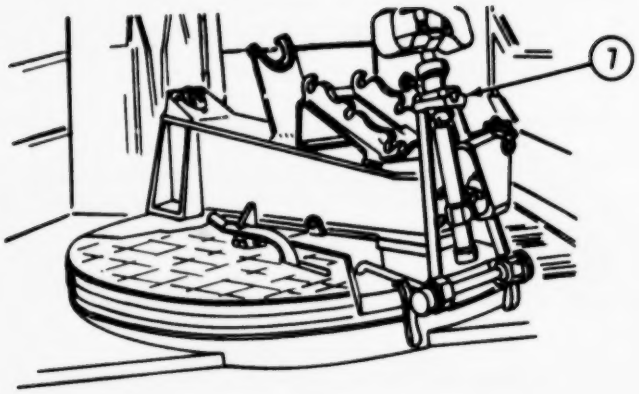


DISMOUNTING THE MORTAR FROM M125A1/A2 CARRIER - Continued.

4 Unlock clevis locking pin (6). Remove mortar barrel from bipod assembly (7).



5 Put bipod assembly (7) in travel position.



CHAPTER 3
MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

NOTE

- These lubrication instructions are mandatory.
- General purpose lubricating oil (item 13, app D) is the prime lubricant. LAW (item 14, app D) may be used for continuous subzero environments.

1 Intervals are based on usual operating conditions. For unusual operating conditions, do the lubricating procedures more often. When the weapon is not being used, the intervals may be extended if proper lubrication procedures have been followed.

WARNING

Dry cleaning solvents (SD) and paint thinners (TPM) are flammable. Do not clean parts near an open flame or in a smoking area. Dry cleaning solvents and paint thinners evaporate quickly and have a drying effect on the skin. When used without protective gloves, these chemicals may cause irritation to, or cracking of, the skin.

2 Clean fittings before lubricating. Clean parts with dry cleaning solvent (item 9, app D). Dry before lubricating.

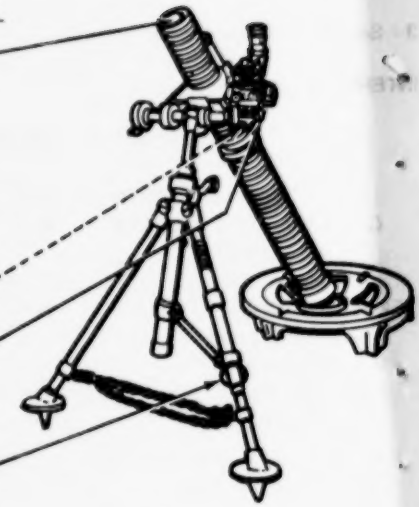
3 See FM 9-207 for arctic operations.

INTERVAL W-Weekly

	LUBRICANT	-	INTERVAL
Barrel	GPL Oil	-	W
Outside Unpainted Surfaces	GPL Oil	-	W
Traversing Crank Elevating Mechanism Assembly and Top-Housing Cover Assembly Oil Cup (See Note 1.)	GPL Oil	-	W

INTERVAL W-Weekly

	LUBRICANT	-	INTERVAL
Barrel Bore and Firing Pin Before firing, wipe clean and dry. After firing, clean and lubricate. (See Notes 1, 2 and 3.)	GPL Oil	-	W
Yoke Assembly Oil Cup	GPL Oil	-	W
Clevis Locking Pin Elevating Mechanism Housing Oil Cup	GPL Oil	-	W
Sliding Bracket	GPL Oil	-	W



Note 1 - Bipod assembly should be cleaned and lubricated semiannually by direct support maintenance.

Note 2 - Remove the firing pin before cleaning the bore.

Note 3 - Immediately after firing and for two consecutive days thereafter, clean the cannon bore with RBC (item 7, app D). After the third cleaning, wipe dry and lightly coat with general purpose lubricating oil (item 13, app D). Clean weekly with RBC, wipe dry, and lube with general purpose lubricating oil.

Section II. TROUBLESHOOTING PROCEDURES

The table lists the common malfunctions which you may find during the operation of the 81-mm mortar or its components. You should perform the tests/inspections and corrective actions in the order listed.

This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION

1. MORTAR FAILS TO FIRE.

Step 1. Check for defective ammunition.
Follow misfire procedures starting on pages 2-66 through 2-73.

Step 2. Check for propellant holders or foreign matter in base of tube.
Remove propellant holders or foreign matter.

Step 3. Check for broken firing pin.
Notify organizational maintenance.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

2. MORTAR IS DIFFICULT TO TRAVERSE.

Step 1. Check for a bent traversing spindle assembly.

If damaged, notify organizational maintenance.

Step 2. Check for loose or missing machine screw.

If loose or missing, notify organizational maintenance.

3. MORTAR IS DIFFICULT TO ELEVATE OR DEPRESS.

Turn elevating crank and check for binding or inoperative gears.

If crank binds or is inoperative, notify organizational maintenance.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

4. MORTAR DOES NOT RECOIL PROPERLY.

Check for bent or dented shock absorber tube.

If damaged, notify organizational maintenance.

5. SIGHTUNIT WILL NOT SEAT IN SIGHT SOCKET.

Step 1. Check dovetail for nicks and burrs.

Notify organizational maintenance.

Step 2. Check for broken or bent sight socket.

If damaged, notify organizational maintenance.

6. SIGHTUNIT CONTROLS DO NOT OPERATE.

Step 1. Check to see if locking knobs are tightened.

Release locking knobs.

Step 2. Check for dirt and grit.

Clean thoroughly.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
7. POOR VISIBILITY IN SIGHTUNIT LENS.
Step 1. Check lens for cracks or breaks. Notify organizational maintenance.
Step 2. Check lens for moisture. Place sightunit in a warm area to see if moisture clears. Don't apply heat directly to sight lens. If moisture doesn't clear, notify organizational maintenance.

Section III. MAINTENANCE PROCEDURES

INTRODUCTION

Inspect and service the 81-mm mortar and the fire control material in accordance with PMCS table. See page 2-7.

WARNING

Dry cleaning solvents (SD) and paint thinners (TPM) are flammable. Do not clean parts near an open flame or in a smoking area. Dry cleaning solvents and paint thinners evaporate quickly and have a drying effect on the skin. When used without protective gloves, these chemicals may cause irritation to, or cracking of, the skin.

INSTRUMENT LIGHT M53E1.

Battery Replacement

NOTE

BA-30 battery is the same as the commercial D-size battery. BA-3030 battery is for cold weather operations only.

1 Unscrew cap (1) and remove batteries (2).

NOTE

Face positive (+) end of battery toward rheostat knob (9).

2 Install new batteries (2) (item 2 or 3, app D) and replace cap (1).

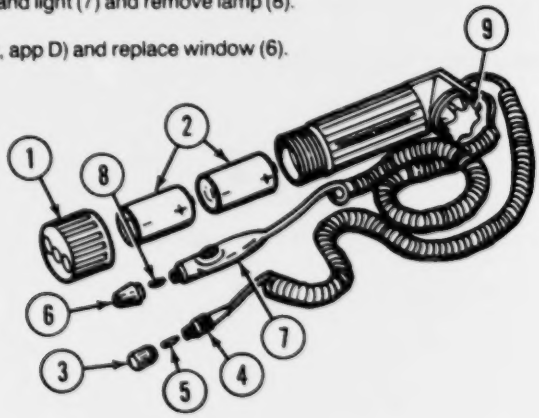
Lamp Replacement

1 Unscrew protective cap (3) from reticle light (4) and remove lamp (5).

2 Install new lamp (5) (item 12, app D) and replace protective cap (3).

3 Unscrew window (6) from hand light (7) and remove lamp (8).

4 Install new lamp (8) (item 12, app D) and replace window (6).



AIMING POST LIGHT M14.

Battery Replacement

NOTE

BA-30 battery is the same as the commercial D-size battery. BA-3030 battery is for cold weather operations only.

1 Unscrew and remove cap plugs (1 and 2).

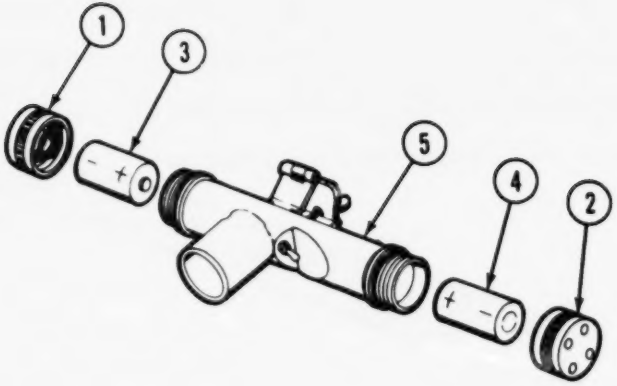
2 Remove batteries (3 and 4).

NOTE

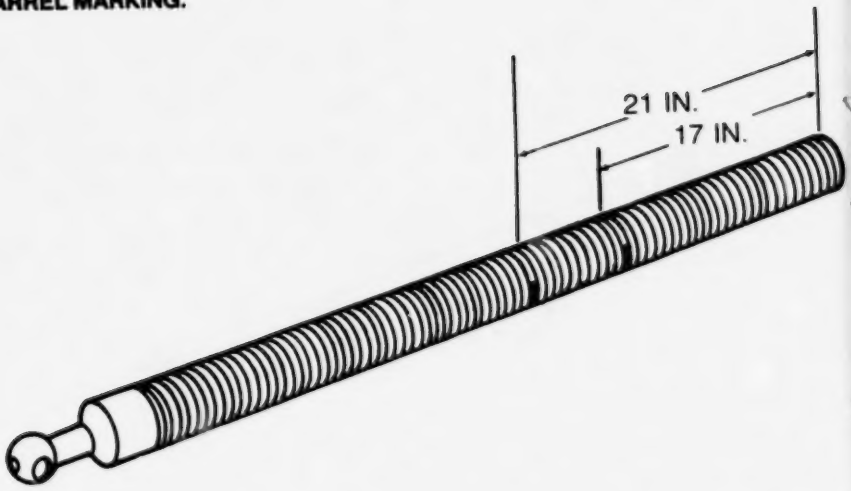
Face positive (+) end of battery toward center of case assembly (5).

3 Replace batteries (3 and 4) (item 2 or 3, app D).

4 Install and tighten cap plugs (1 and 2).


1
3
5
4
2

BARREL MARKING.



NOTE

First marking is 17 inches from muzzle. Second marking is 21 inches from muzzle.

If There Are No Graduation Marks on Barrel:

1 Clean thread area with dry cleaning solvent (item 9, app D) and dry thoroughly.

2 Paint a 1 1/2-inch long mark on crest of thread nearest to 17 inches from muzzle.

3 Paint another 1 1/2-inch long mark on crest of thread nearest to 21 inches from muzzle.

4 The marks should be alined with the flat sides of the base cap.

If There Is a 23-Inch Mark:

1 Remove paint using abrasive cloth (item 8, app D).

2 Clean thread area with dry cleaning solvent (item 9, app D) and dry thoroughly.

3 Re-mark thread nearest to 21 inches from muzzle.

OPTICAL PARTS - CARE AND CLEANING.

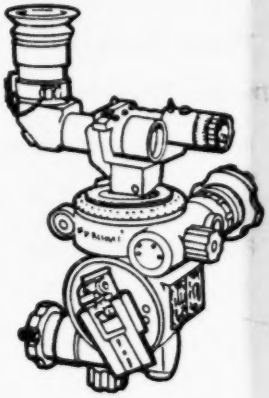
CAUTION

- Keep exposed surfaces of lenses and other parts clean and dry to prevent or retard corrosion of metal and etching of surfaces of glass.
- Never use polishing liquids, pastes, or abrasives to polish lenses and windows.

Wiping

1 Use only lens paper (item 15, app D), especially intended for cleaning optical glass.

2 Do not use cleaning cloths.



Cleaning

1 Keep optical parts free from oil and grease.

2 Do not touch lenses or windows with bare fingers.

3 Apply alcohol (item 1, app D) with lens paper (item 15, app D) and wipe gently with clean lens paper to remove oil or grease from optical surfaces.

NOTE

If alcohol (item 1, app D) is not available and temperature is above freezing, breathe heavily on glass and wipe off with clean lens paper (item 15, app D). Repeat this operation until clean.

Cold Weather Cleaning

1 Clean optical surfaces with lens paper (item 15, app D) moistened with alcohol (item 1, app D).

2 If alcohol (item 1, app D) is not available, use dry lens paper (item 15, app D).

3 Wipe gently to avoid scratching or removing coated surface of optics.

OPTICAL PARTS - CARE AND CLEANING - Continued.

Moisture

1 Condensation may cause moisture to collect on optical parts of instrument when temperature of parts is lower than that of surrounding air.

CAUTION

Do not apply heat directly from concentrated sources. This could cause unequal expansion of parts, leading to damage and inaccurate functioning of optical parts.

2 If moisture from condensation is not excessive, you can remove it by placing instruments in a warm place.

3 If moisture from condensation is excessive, notify organizational maintenance.

Section IV. OPERATION AND MAINTENANCE OF AUXILIARY EQUIPMENT

Refer to TM 9-6920-212-14 for operation of pneumatic mortar trainer M32 or M32A1.

CHAPTER 4
AMMUNITION

Section I. AUTHORIZED CARTRIDGES

WARNING

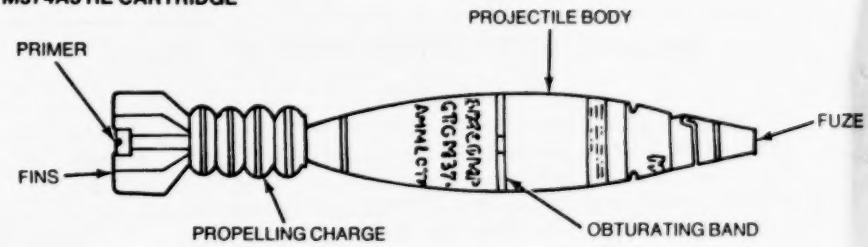
The M800 Series Cartridges (M821 HE, M889 HE, M819 Smoke (RP), M853A1 Illum and M879 TP) are NOT to be fired above Charge 3. The M821 and M889 may be fired at Charge 3 ONLY in a combat emergency. Firing of the M821 and M889 for training purposes is limited to Charge 2. Firing above Charge 3 can cause SEVERE damage to the mortar and SEVERE injury to the crew.

The following cartridges are authorized to be fired in the M29A1 mortar:

Cartridge, 81mm: HE, M374 series
Cartridge, 81mm: HE, M362 series
Cartridge, 81mm: Smoke, WP, M375 series
Cartridge, 81mm: Smoke, WP, M370 series
Cartridge, 81mm: Smoke, WP, M57 series
Cartridge, 81mm: Illum, M301 series
Cartridge, 81mm: Training, M68
Cartridge, 81mm: Mortar training device
Cartridge, 81mm: HE, M821
Cartridge, 81mm: HE, M889
Cartridge, 81mm: Smoke, RP, M819
Cartridge, 81mm: Illum, M853A1
Cartridge, 81mm: Practice, TP, M879
Cartridge, 81mm: Practice, SR, M880

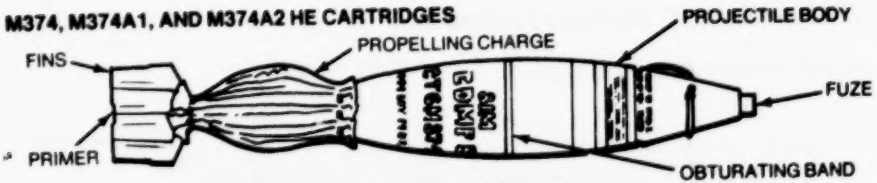
AUTHORIZED CARTRIDGES - Continued.

M374A3 HE CARTRIDGE



Type use:	High explosive/Fragmentation and blast
Identification:	Olive Drab w/yellow markings.
Components:	
Fuze:	PD, M524 series PD, M567
Propelling charge:	M205
Max range:	4800 meters

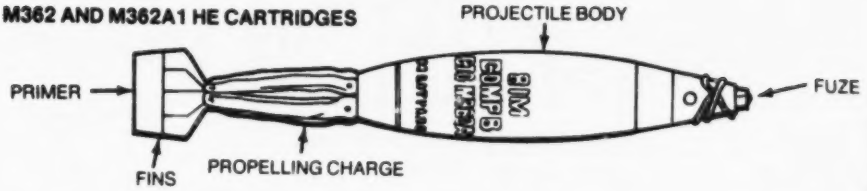
M374, M374A1, AND M374A2 HE CARTRIDGES



Type/Use:	High explosive/Fragmentation and blast
Identification:	Olive drab w/yellow markings
Components:	
Fuze:	PD M524 series PD M526 series PD M567 VT M532
Propelling charge:	M90 (M374) M90A1 (M374A1 and M374A2)
Max range:	4500 meters
Limitations:	Cartridges assembled with fuze, PD M524A1, M524A2, M524A3, and M524A4 are for USMC/USN use only. Cartridges assembled with fuze, VT M532 must be fired above charge 0. Short rounds may be expected when firing below charge 4.

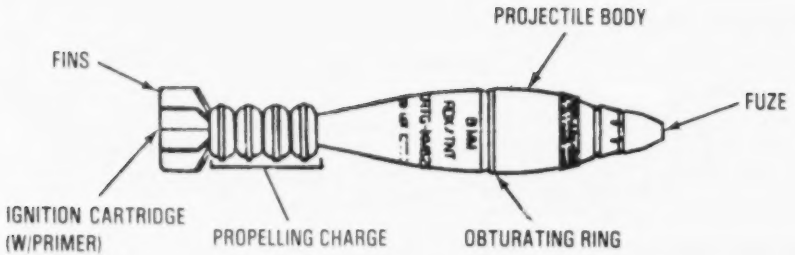
AUTHORIZED CARTRIDGES - Continued.

M362 AND M362A1 HE CARTRIDGES



Type/Use:	High explosive/Fragmentation and blast
Identification:	Olive drab w/yellow markings
Components:	
Fuze:	PD M524 series PD M526 series VT M532
Propelling charge:	M5
Max range:	3618 meters
Limitations:	Cartridges assembled with fuze, PD M524A1, M524A2, M524A3, and M524A4 are for USMC/USN use only. Cartridges assembled with fuze, VT M532 must be fired above charge 0.

M821 HE CARTRIDGE



TYPE/USE: High explosive/fragmentation and blast

IDENTIFICATION: Olive drab w/yellow markings

COMPONENTS: Fuze, Multi-option, M734
Propelling Charge, M223

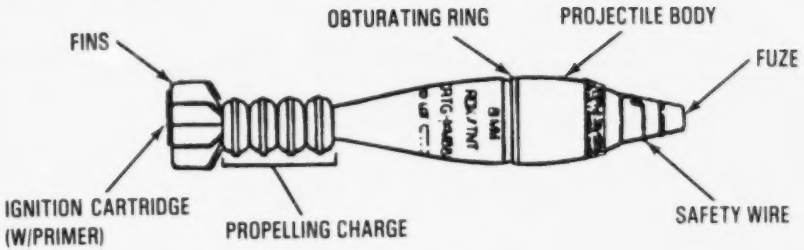
MAXIMUM RANGE: 5700 meters

WARNING

NEVER USE ABOVE CHARGE 3. Charge 3 may only be used in a combat emergency. Charge 2 is the maximum for training.

AUTHORIZED CARTRIDGES – Continued.

M889 HE CARTRIDGE



TYPE/USE: High explosive/fragmentation and blast

IDENTIFICATION: Olive drab w/yellow markings

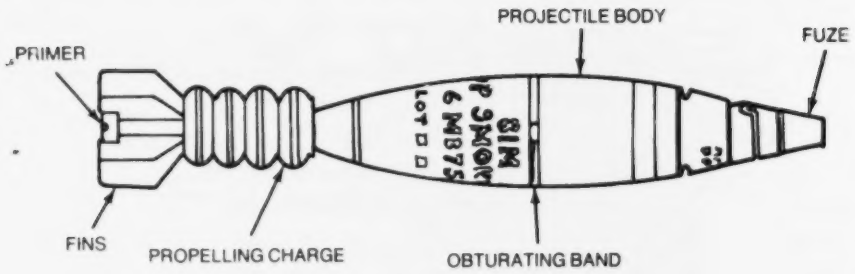
COMPONENTS: Fuze, Point Detonating, M935
Propelling Charge, M223

MAXIMUM RANGE: 5700 meters

WARNING

NEVER USE ABOVE CHARGE 3. Charge 3 may only be used in a combat emergency. Charge 2 is the maximum for training.

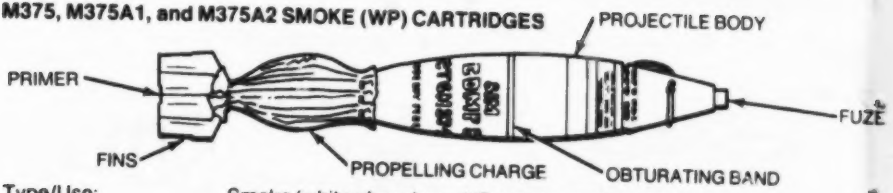
M375A3 SMOKE (WP) CARTRIDGE



Type/Use:	Smoke (white phosphorus)/Screening and spotting
Identification:	Light green w/yellow band and light red markings
Components:	
Fuze:	PD M524 series
	PD M567
Propelling charge:	M205
Max range:	4800 meters

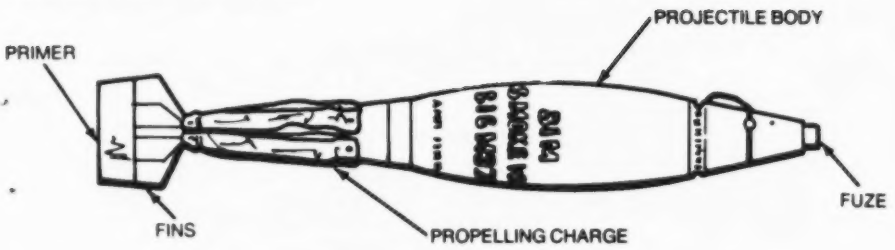
AUTHORIZED CARTRIDGES - Continued.

M375, M375A1, and M375A2 SMOKE (WP) CARTRIDGES



Type/Use:	Smoke (white phosphorus)/Screening and spotting
Identification:	Light green w/yellow band and light red markings
Components:	
Fuze:	PD M524 series PD M526 series PD M567
Propelling charge:	M90 (M375) M90A1 (M375A1 and M375A2)
Max range:	4500 meters
Limitations:	Cartridges assembled with fuze, PD M524A1, M524A2, M524A3, and M524A4 are for USMC/USN use only. Short rounds may be expected when firing below charge 4.

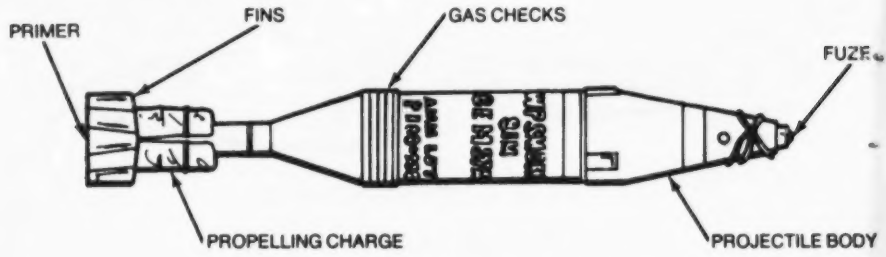
M370 SMOKE (WP) CARTRIDGE



Type/Use:	Smoke (white phosphorus)/Screening and spotting
Identification:	Light green w/yellow band and light red markings
Components:	
Fuze:	PD M524 series PD M526 series
Propelling charge:	M5
Max range:	3646 meters
Limitations:	Cartridges assembled with fuze, PD M524A1, M524A2, M524A3 and M524A4 are for USMC/USN use only.

AUTHORIZED CARTRIDGES - Continued.

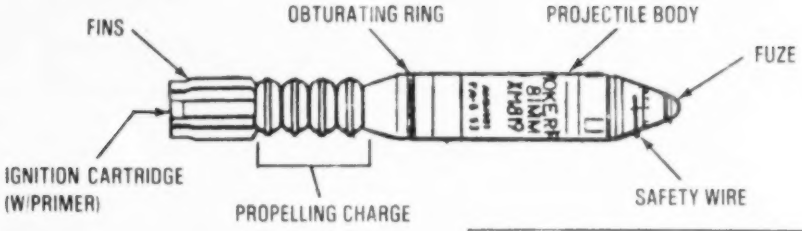
M57 AND M57A1 (WP) SMOKE CARTRIDGES



Type/Use:	Smoke (white phosphorus)/Screening and spotting
Identification:	Gray w/yellow band and yellow markings
Components:	
Fuze:	PD M525 series
Propelling charge:	M2A1
Max range:	2169 meters

AUTHORIZED CARTRIDGES—Continued.

M819 SMOKE CARTRIDGE



TYPE/USE: Smoke (red phosphorous pellets)/screening

IDENTIFICATION: Light green w/black markings and one brown band

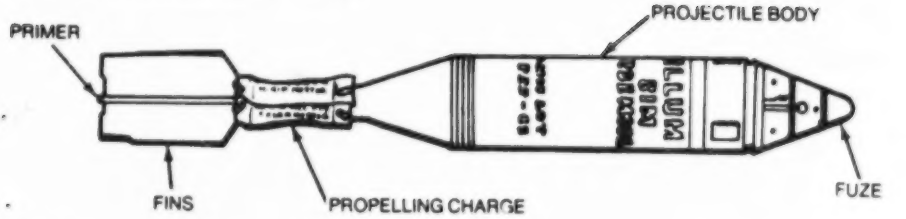
COMPONENTS: Fuze, Mechanical Time Superquick, M772
Propelling Charge, M218

MAXIMUM RANGE: 5100 meters (impact)

WARNING

NEVER USE ABOVE CHARGE 3. Charge 3 may only be used in a combat emergency. Charge 2 is the maximum for training.

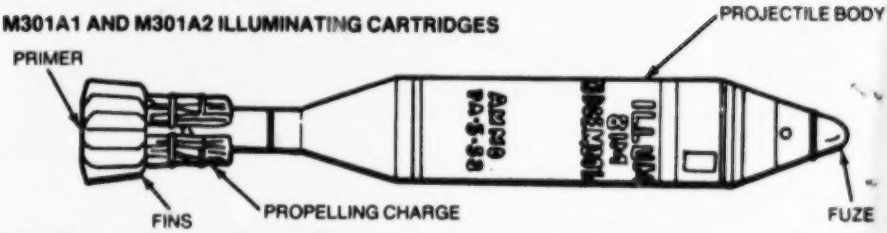
M301A3 ILLUMINATING CARTRIDGE



Type/Use:	Illumination
Identification:	White w/black markings
Components:	
Fuze:	Time, M84A1
Propelling charge:	M185
Max range (Burst):	3150 meters
Limitations:	Cartridge cannot be fired below charge 3.
Remarks:	Cartridge contains an illuminating candle parachute assembly. Candle provides a minimum of 500,000 candlepower illumination for at least 60 seconds.

AUTHORIZED CARTRIDGES - Continued.

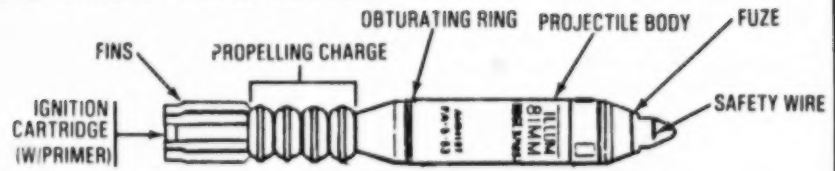
M301A1 AND M301A2 ILLUMINATING CARTRIDGES



Type/Use:	Illumination
Identification:	White w/black markings
Components:	
Fuze:	Time, M84
Propelling charge:	M2A1
Max range (Burst):	2150 meters
Limitations:	Cartridge cannot be fired below charge 2.
Remarks:	Cartridge contains an illuminating candle/parachute assembly. Candle provides a minimum of 500,000 candlepower illumination for at least 60 seconds.

AUTHORIZED CARTRIDGES – Continued.

M853A1 ILLUMINATING CARTRIDGE



TYPE/USE: Illumination

IDENTIFICATION: White w/black markings

COMPONENTS: Fuze – Mechanical Time Superquick, M772 or Propelling Charge, M219

MAXIMUM RANGE: 5100 meters (burst)

WARNING

NEVER USE ABOVE CHARGE 3

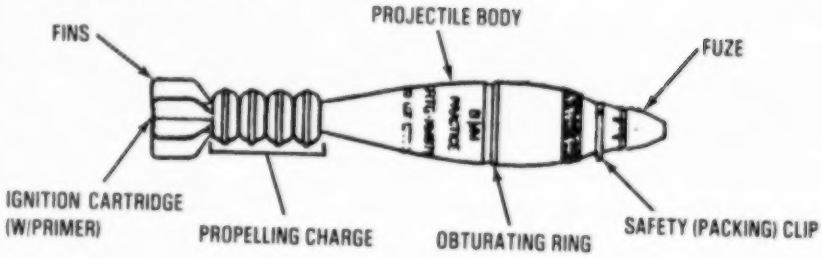
Charge 3 may only be used in a combat emergency. Charge 2 is the maximum for training.

REMARKS:

1. Cartridge contains an illuminating candle/parachute assembly.
2. Candle provides a minimum of 600,000 candlepower illumination for at least 60 seconds.

AUTHORIZED CARTRIDGES – Continued.

M879 PRACTICE CARTRIDGE



TYPE/USE: Target practice (full range)/training

IDENTIFICATION: Blue w/white markings and one brown band

COMPONENTS: Fuze, Point Detonating (Practice) M751
(Type I or Type II)
Propelling Charge, M220

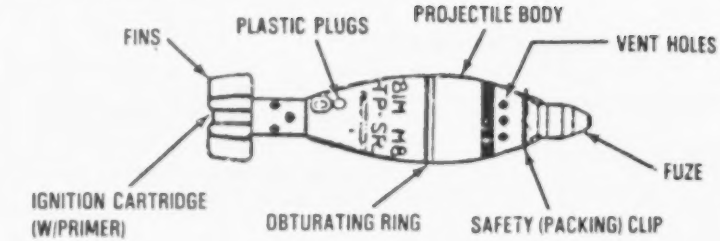
WARNING
NEVER USE ABOVE CHARGE 3. Charge 3 may only be used in a combat emergency. Charge 2 is the maximum for training.

MAXIMUM RANGE: 5600 meters

REMARKS:

1. Cartridges with Type I, M751 Fuzes resemble M821 HE cartridges (as shown on page 4-1).
2. Cartridges with Type II, M751 Fuzes resemble M889 HE cartridges.
3. Projectile body contains an inert fill.
4. A pyrotechnic smoke charge in the fuze produces a flash, an audible sound and a smoke cloud on impact.

M88C PRACTICE CARTRIDGE



TYPE/USE: Target practice (short range)/training

IDENTIFICATION: Blue w/white markings and one brown band

AUTHORIZED CARTRIDGES – Continued.

COMPONENTS: **Fuze, Point Detonating (Practice) M775**
(Type I or Type II)
Propelling Charge – ignition cartridge only

MAXIMUM RANGE: 5600 meters

REMARKS:

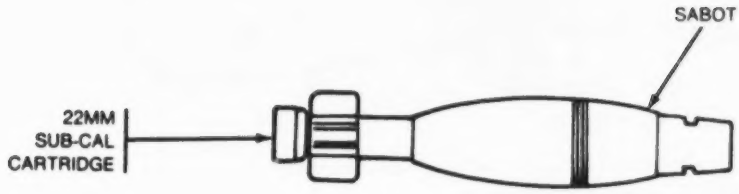
1. Projectile body is hollow.
2. Range of cartridge is reduced by removing plastic plugs from projectile body. Removal of plugs allows gases to escape (from the mortar barrel) through the body and out the vent holes.
3. A pyrotechnic smoke charge in the fuze produces a flash, an audible sound, and a smoke cloud on impact.
4. The spent (fired) projectiles can be recovered for rebuilding and reuse. Refer to TM 9-1315-252-10 for instructions and limitations.

M68 TRAINING CARTRIDGE

Type/Use:	Training
Identification:	Black w/white markings
Components:	
Fuze:	None
Propelling charge:	M6 or M3 ignition cartridge only
Max range:	284 meters
Remarks:	Cartridge can be fired as shipped (disregard section II of this chapter).
	Cartridge can be reused (ignition cartridge and/or primer must be replaced before cartridge can be refired).

AUTHORIZED CARTRIDGES - Continued.

81 MM MORTAR TRAINING DEVICE



Type/Use:	Training
Components:	Sabot, M1 22-mm Subcalibur cartridge (M744, M745, M746, or M747)
Remarks:	Refer to TM 9-1315-249-12&P for additional information and instructions on its use.

Section II. PREPARATION FOR FIRING

1 Unpack cartridge. Handle with utmost care. Do not drop, drag, throw, tumble or strike packaged or unpackaged ammunition or related components. Attempts to fire ammunition that has been roughly handled is extremely dangerous.

NOTE

DO NOT remove U-shaped clip from fuze of a M879 TP cartridge until just prior to firing. The clip is a safety pin/packing stop.

a. Remove packing stop from fuze (or closing plug) (except for M879 TP cartridge).

b. Move any protective bags, shell insert assemblies, and desiccant bags secured to or covering fin assembly.

2 Remove and properly dispose of one propelling charge from M800 Series cartridges, leaving a maximum of three.

3 Assemble fuze to cartridge,if cartridge was shipped unfuzed (p 4-21).

4 Set fuze for required time or desired type of burst (p 4-23).

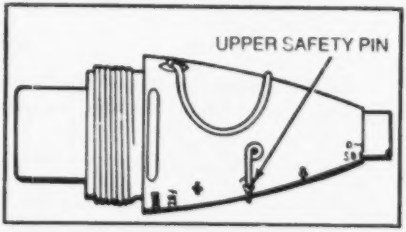
5 Adjust propelling charge for desired range (p 4-31).

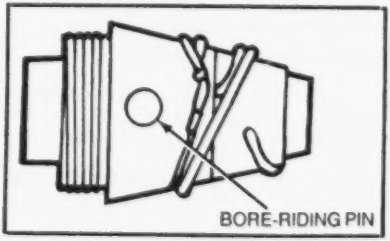
PREPARATION FOR FIRING - Continued.

6 Remove safety pin/pull wire from fuze (just prior to loading and firing cartridge).

WARNING

- M524 PD FUZE - Do not fire cartridge if eye of upper safety pin breaks off and/or safety pin cannot be removed. Notify EOD.
- M525 AND M526 PD FUZES - Do not fire cartridge if fuze makes a buzzing sound when removing safety pins. Check fuze for presence of bore-riding pin after removing safety pin. Do not fire cartridge if bore-riding pin is missing. Notify EOD.





Section III. LOADING AND FIRING

WARNING

- PD and VT fuzes may prematurely detonate when fired during heavy rainfall.
- Firing temperature limits are – 40°F to + 125°F.
- All cartridges must be inspected for damage prior to firing.
- Do not fire ammunition with damaged fins, leaking or missing propellant containers, damaged obturators, or damaged fuzes.
- Do not fire ammunition through overhead obstructions or over the heads of unprotected personnel.

CAUTION

Before loading cartridge into cannon, assure that all components are free of sand, mud, moisture, frost, snow, ice, or other foreign matter.

See chapter 2 for instruction on loading and firing.

Section IV. UNFIRED CARTRIDGES

1 Replace safety wire, if removed from fuze.

CAUTION

Replace upper safety pin first on PD M524, M525, and M526 fuzes.

2 If safety pins cannot be fully reinserted into fuze, notify EOD.

UNFIRED CATHRIDGES - Continued.

3 Reset fuze.

NOTE

Do not attempt to reset M532 PD fuzes. Fuzes set for PD action cannot be returned to prox mode.

4 Remove fuze, if cartridge was shipped unfuzed. Reinstall closing plug.

5 Except for M800 series cartridges, reinstall propellant increments so that cartridge has a full charge. For M800 Series cartridges, reinstall only 3 increments.

6 Install packing stop. Repack cartridge in original packaging.

Section V. CARE AND HANDLING OF CARTRIDGES

1 Do not throw or drop live ammunition.

2 Use proper tools to open ammo boxes and ammo containers.

3 Do not break moisture resistant seal of ammunition containers until cartridges are to be fired.

4 Protect cartridges when removed from ammo container. Protect ammunition from rain and snow. If protector bags were packed with cartridges, cover fin assembly and propelling charge to prevent moisture contamination. Stack cartridges on top of empty ammo boxes. Cover cartridges with plastic sheets provided.

5 Protect ammunition from direct rays of the sun.

6 Store WP-loaded cartridges at temperatures below 111°F to prevent melting of the WP filler. If this is not possible, WP-loaded cartridges must be stored fuze-end up so that the WP will resolidify with the void space in the nose end of the cartridge (when the temperature returns below 111°F). Failure to observe this precaution could result in rounds with erratic flight.

7 Do not transport ammunition which is not properly secured to vehicle.

8 Store WP-loaded munitions separate from other types of ammunition.

9 Notify EOD of leaking WP cartridges. Avoid contact with any leakers.

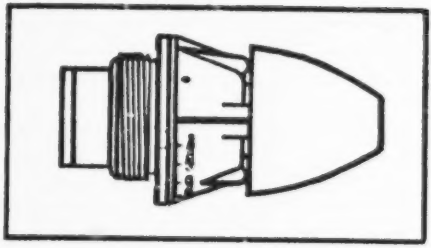
10 Do not handle duds.

Section VI. FUZES

Multi-Option, M734 Fuze

FUNCTIONS: Prox/impact

SETTINGS: Prox, near surface burst, impact, or 0.05 second delay action.

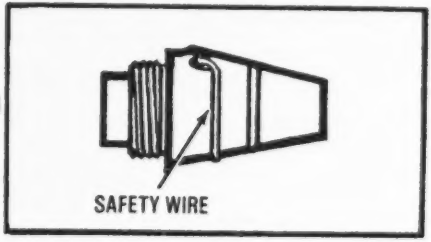


POINT DETONATING, M935 FUZE

FUNCTIONS: Impact

SETTINGS: Superquick or 0.05 second delay action.

REMARKS: Fuze has a safety wire.



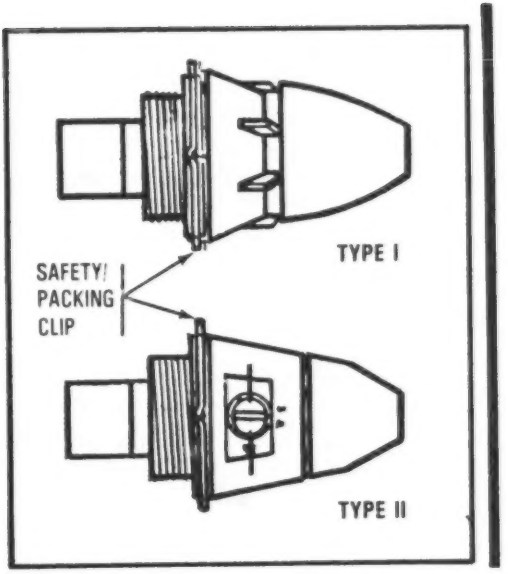
FUZES – Continued.

POINT DETONATING, M751 and M775 FUZE

FUNCTIONS: Impact

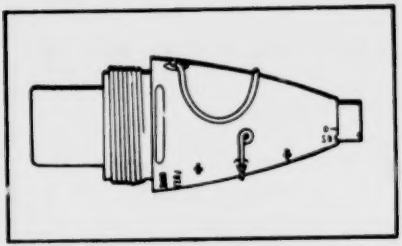
SETTINGS: Dummy multi-option -- PRX/NSB/IMP/DLY (Type I Ogive)
Dummy point detonating -- SQ/D (Type II Ogive)

REMARKS: Fuze has a smoke charge and safety/packing clip.



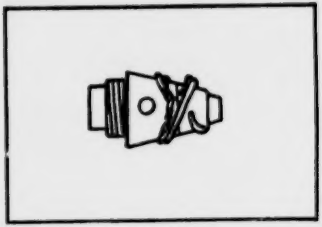
FUZES-Continued

PD M524 SERIES FUZE.



Type:	Point detonating
Functions:	Impact
Setting:	Superquick or 0.05 second delay action
Remarks:	Fuze has a booster charge, delay arming mechanism, and safety wire.

PD M525 SERIES FUZE.



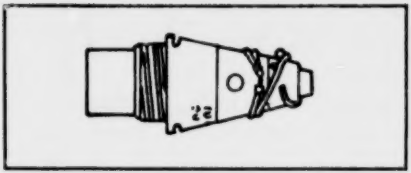
Type:	Point detonating
Functions:	Impact (superquick action only)
Remarks:	Fuze has a booster charge, delay arming mechanism, bore- riding pin, and safety wire.

PD M526 SERIES FUZE.

Type: Point detonating

Functions: Impact (superquick action only)

Remarks: Fuze consists of a M525 PD Fuze assembled to a boostered adapter.



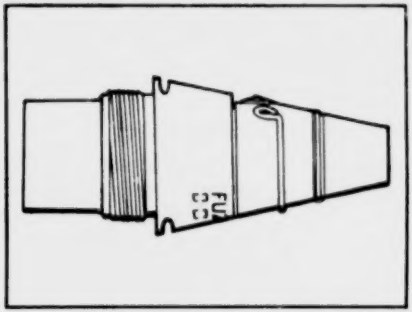
PD M567 SERIES FUZE.

Type: Point detonating

Functions: Impact

Setting: Superquick or 0.05 second delay action

Remarks: Fuze has a booster charge, delay arming device, and safety wire.



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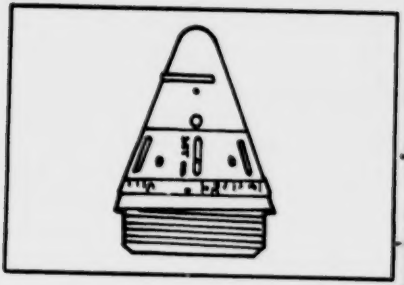
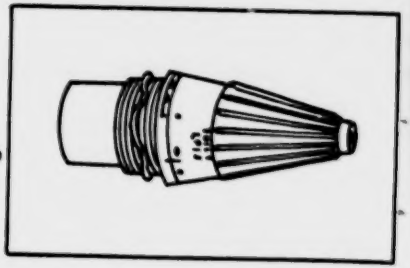
FUZES - Continued.

TIME M84 SERIES FUZE.



Type:	Time
Functions:	Air burst
Setting:	0 - 25 seconds (M84) 0 - 50 seconds (M84A1)
Remarks:	Fuze has an expelling charge powder time train/rings and safety wire.

VT M532 FUZE.



Type:	Proximity
Functions:	Proximity/impact
Remarks:	Fuze has a booster charge, radio transmitter/detector, and PD element. Fuze functions when its radio waves are reflected off the target (prox mode).

MECHANICAL TIME SUPERQUICK, M772 FUZE

FUNCTIONS: Airburst/impact

SETTINGS: 4-55 seconds (1/2 second intervals)

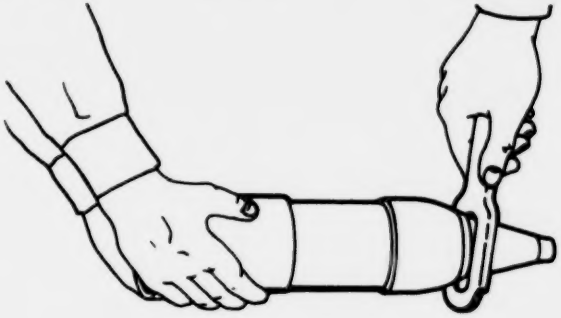
REMARKS: Fuze has an expelling charge and safety wire.

Section VII. INSTALLATION OF FUZES

WARNING

- Do not hammer on fuze wrench or use an extension on the handle.
- Fuze must be fully seated onto the projectile body. Do not stake fuze.
- Use only authorized cartridge/fuze combinations.

1 Remove closing plug from cartridge. Use a M18 fuze wrench to loosen closing plug. Turn handle of wrench in counterclockwise direction.



INSTALLATION OF FUZES - Continued.

2 Inspect fuze threads and fuze well threads for damage. Do not use fuze if thread is damaged. Do not use projectile if fuzewell thread is damaged or if explosive is visible on thread.

3 Screw fuze into projectile body. Seat fuze and secure it with an M18 fuze wrench. There must be no visible gap between fuze and projectile body.

4 If binding occurs, unscrew fuze and recheck threads.

Section VIII. FUZE SETTING

M524 PD FUZES.

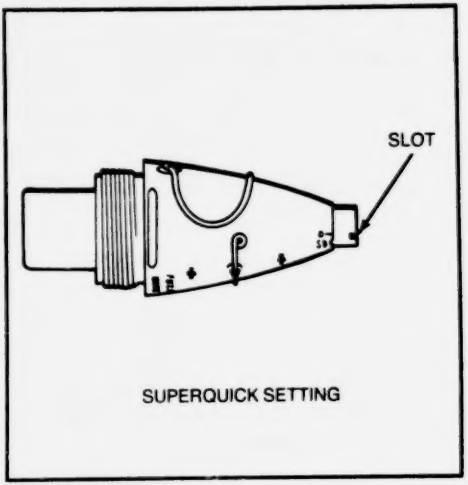
1 Superquick setting

a. These fuzes are shipped preset to function superquick on impact.

b. Verify setting prior to firing. Slot in striker should be alined with SQ-marking and notch on ogive.

2 Delay setting

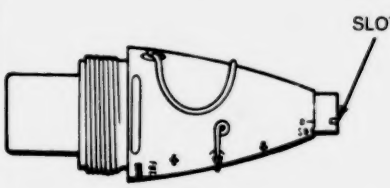
a. Turn striker slot in clockwise direction until slot is alined with D-marking and line on ogive.



SUPERQUICK SETTING

FUZE SETTING - Continued.

b. Use bladed end of a M18 fuze wrench to change settings.



DELAY SETTING

M525, M526 AND M751 PD FUZES.

1 These fuzes only function superquick on impact.

2 Remove safety wire from M526 PD Fuze just prior to firing.

3 Remove safety/packing clip from M751 fuze just prior to firing.

4 No other action is required.

5 M751 Fuze has dummy multi-option - PRX/NSB/IMP/DLY or dummy PD - SQ/D settings (for practice, only).

M567 AND M935 PD FUZES

1 Superquick setting.

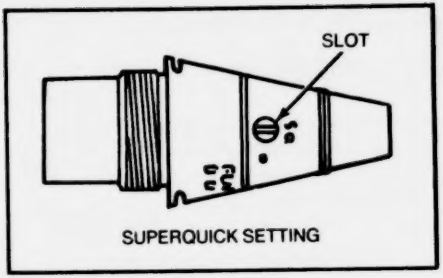
a. These fuzes are shipped preset to function superquick on impact.

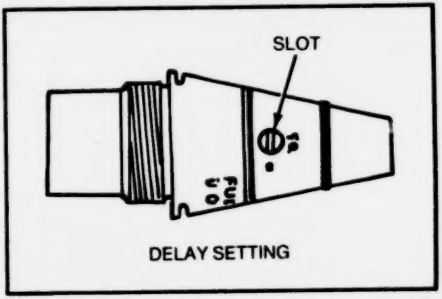
b. Verify setting prior to firing. Selector slot should be alined with SQ-mark on ogive.

2 Delay setting.

a. Turn selector slot in clockwise direction until slot is alined with D-marking on ogive.

b. Use bladed end of a M18 fuze wrench to change settings.





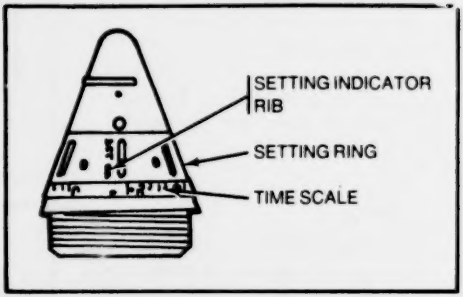
FUZE SETTING - Continued.

M84 SERIES TIME FUZES.

1 Rotate setting ring in counterclockwise direction until setting indicator rib (marked set) is alined with correct line (boss) and number of seconds of time scale.

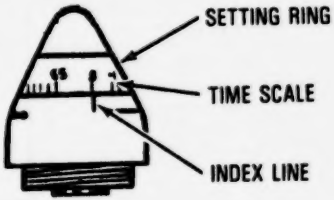
2 Use a M25 fuze setter to turn the setting ring.

3 See firing tables for correct time settings.



M772 MTSQ FUZE

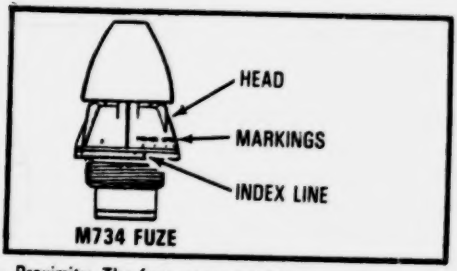
1. Rotate setting ring or head of fuze in clockwise direction until correct line and number of seconds on time scale is aligned with index line.
2. Use wrench NSN 5120-00-203-4801 or a 1-3/4 inch open-end wrench to turn setting ring or head of fuze.



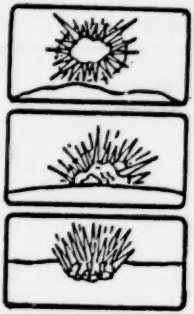
M772 MTSQ FUZE

M734 MD FUZE

1. Fuzes can be set by hand.
2. Set fuze by rotating fuze head (in clockwise direction) until correct marking (PRX, NSB, IMP, or DLY) is over index line.
3. Next illustration depicts burst types.



M734 FUZE



PRX – Proximity. The fuze comes set to PRX. (Burst height is 6-15 ft.)

NSB – Near Surface (non jamming) (Burst height is 0-3 ft.)

IMP – Impact (SQ)

DLY – Delay (0.050 seconds)

M532 VT FUZE.

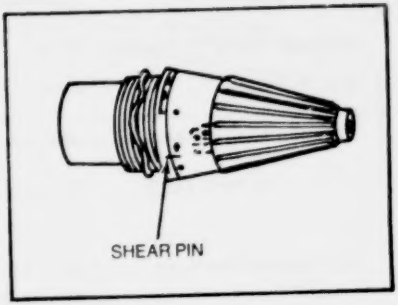
1 Proximity setting. Use fuze as shipped.

2 Examine shear pin of fuze to determine if it may once have been set.

NOTE

Fuzes set for PD action cannot be returned to prox mode. Fuzes with broken shear pins may function PD instead of prox.

3 PD setting. Rotate nose of fuze (by hand) a minimum of 1/3 turn (120°) in either direction.



Section IX. RESETTING FUZES

M524 Series PD Fuze - Aline slot in striker with SQ-marking and notch in ogive.

M525 and M526 PD Fuzes - None.

M751 PD FUZE - None

M935 AND M567 PD FUZES - Aline selector slot with SQ-marking on ogive.

M772 MTSQ TIME FUZE - Rotate setting ring or head of fuze until S-line of time scale is aligned with index ring.

M84 Series Time Fuze - Aline setting indicator rib with S- marking of time scale. Turn setting ring in counterclockwise direction only.

M532 VT Fuze - Do not reset fuze.

M734 MULTI-OPTION FUZE - Rotate head of fuze in counterclockwise direction until PRX-marking is over index line.

Section X. FUZE WRENCH/SETTING

M18 FUZE WRENCH.

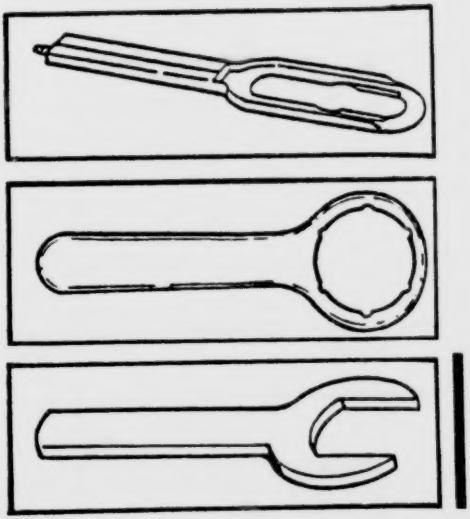
1. Wrench for assembling fuze to cartridge.
2. Bladed tip on end for setting PD type fuzes.

M25 FUZE SETTER.

1. Sets M84 series time fuzes.
2. Notches in setter engages ribs in setting ring of fuze.

FUZE SETTING WRENCH

1. Sets M772 MTSQ fuze.
2. Engage 1-3/4 inch flats on setting ring or head of fuze.



Section XI. PROPELLING CHARGES

MODEL NO.	NO. OF INCREMENTS	TYPE OF CONTAINER	TYPE OF PROPELLANT
M2A1	4	Cellophane bags	M8 sheets (bundles)
M5	8	Water-repellant cotton (cloth) bags	M9 flake
M90	9	Water-repellant cotton (cloth) bags	M9 flake
M90A1	9	Silk or acrylic (acetate laminated) cloth bags	M9 flake
M185	8	Water-repellant cotton (cloth) bags	M9 flake
M205, M218, M219, M220 and M223	4	Nitrocellulose/fiber containers (horseshoe-shaped)	M10 flake

Section XII. ADJUSTMENT OF PROPELLING CHARGE

WARNING

The M800 Series Cartridges (M821 HE, M889 HE, M819 Smoke (RP), M853A1 Illum and M879 TP) are NOT to be fired above Charge 3. The M821 and M889 may be fired at Charge 3 ONLY in a combat emergency. Firing of the M821 and M889 for training purpose is limited to Charge 2. Firing above Charge 3 can cause SEVERE damage to the mortar and SEVERE injury to the crew.

Propelling charges are not interchangeable. Do not substitute one model for another. Do not mix lots.

Reposition remaining propellant increments rear of fin assembly when firing M821 HE, M889 HE, M374A3 HE, M375A3 WP, M819 RP, M853A1 Illum or M879 TP cartridges with less than full charge (4 increments).

Charge A increment of the M90 and M90A1 propelling charge must be used when firing above Charge 0.

1 Cartridges are shipped with a complete propelling charge, ignition cartridge, and primer.

2 Use firing table to determine proper charge for firing.

ADJUSTMENT OF PROPELLING CHARGE – Continued.

3 With exception of M880 TP cartridge, M68 training cartridge, and sabot training device, reduce range of cartridge by removing appropriate number of increments from fin assembly. Adjacent chart shows number of increments that should be remaining.

4 Charge A increments must be used when firing above charge 0 for M90 and M90A1 propelling charges.

Charge 0 – Ignition cartridge only

Charge 1 – Ignition cartridge and one increment

Charge 2 – Ignition cartridge and two increments

Charge 9 – Ignition cartridge and nine increments

5 Slide remaining increments towards rear, until charge is against fins (M821 HE, M889 HE, M374A3 HE, M375A3 WP, M819 RP, M853A1 Illum and M879 TP cartridges only). Failure to reposition increments could result in improper ignition and a short round.

6 Reduce range of M880 TP cartridge by removing plastic plugs from projectile body. Adjacent chart shows number of plugs that should be remaining.

7 Place excess increments in an empty ammunition box for protection. Close lid of box during firing to prevent accidental ignition from burning debris/residue.

Charge 0 — Ignition cartridge only

Charge 1 — Ignition cartridge and one plug

Charge 2 — Ignition cartridge and two plugs

Charge 3 — Ignition cartridge and three plugs

Section XIII. UNUSED PROPELLING CHARGE INCREMENTS

WARNING

When burning excess increments:

- Burning area must be at least 100 meters from the nearest mortar position, parked vehicles and ammunition piles.
- Burning area shall be cleared of all dead grass or brush within 30 meters.

1. Excess increments should be destroyed daily.
2. Destroy increments by burning.
3. Place increments on the ground. Form a row 4 to 6 inches wide and as long as necessary. Do not pile increments more than 1 to 2 inches high.

4. End train of increments with a row of single increments, followed by at least a meter of dry grass or dead leaves.

5. Ignite dry grass or leaves.

6. Allow ensuing fire to self-extinguish.

CHAPTER 5
FOREIGN AMMUNITION (NATO)

GENERAL.

As a result of recent agreements, the United States (US) and a number of its NATO allies intend to establish the interoperability of many weapons systems and ammunition of the various countries. The goal is to enable the safe and effective firing of major types of ammunition of the same size from the same compatible size and type weapon of the NATO armies (e.g., fire a United Kingdom (UK), Canadian (CA), or Norway (NO) 81- mm cartridge from a US 81-mm mortar). Interoperability criteria are now required for many weapons and ammunition items in current development. Determinations are now being made to establish which ammunition items will be authorized for use in US weapons by changes to the applicable ammunition and weapons manuals. NATO nations will provide similar authorization in their manuals. Only authorized NATO ammunition will be used. Those items covered in this change have been authorized. If a munitions item has not been authorized, it is because (1) it has not yet been determined to be safe to fire from a US weapon or (2) it has been determined that the munitions item *cannot be safely* fired from the US weapon system.

FOREIGN AMMUNITION (NATO) - Continued.

NOTE

The interchange of munitions with NATO nations is for combined training exercise (i.e., US Army troops and NATO nation troops). At the conclusion of any training exercise, munitions drawn from NATO nation troops and not consumed (fired) are to be returned to troops of the NATO nation from whom they were obtained.

The following UK munitions are authorized for use in US 81-mm Mortar M29A1:

WARNING

Do not accept any 81-mm high explosive ammunition other than L15A4.

Projectile	81-mm, HE, L15A4
Propelling charge	Mark 2
Fuze	Percussion (PD) L35A1
Cannon used with	M29A1

NOTE

- Remove propellant increment protective cover to adjust charge and fire.

- When firing cartridge L15A4 in the M29A1 cannon, the maximum propelling charge is limited to (5) augmenting cartridges (increments). Remove the first L34A2 augmenting cartridge (increments) - the one that is located nearest the fuze.

The UK Mark 2 propelling charge system consists of:

(1) Three L32A1 augmenting cartridges (increments) containing 180 grains of propellant placed next to the fin.

(2) Three L34A2 augmenting cartridges (increments) containing 285 grains of propellant placed next to the projectile body.

(3) One L33A1 primary ignition cartridge containing 160 grains of propellant designed to screw into tail unit of cartridge, HE, L15A4.

FOREIGN AMMUNITION (NATO) - Continued.

(4) Charges 6 through 1 are assembled as follows:

(a) Charge 6 - All augmenting cartridges (increments) in place. (DO NOT FIRE in US M29A1 cannon.)
(b) Charge 5 - One L34A2 augmenting cartridges (increment) removed.
(c) Charge 4 - Two L34A2 augmenting cartridges (increments) removed.
(d) Charge 3 - Three L34A2 augmenting cartridges (increments) removed.
(e) Charge 2 - Three L34A2 augmenting cartridges (increments) and one L32A1 augmenting cartridges (increments) removed.
(f) Charge 1 - Three L34A2 augmenting cartridges (increments) and two L32A1 augmenting cartridges (increments) removed.
(g) Primary Charge (Charge 0) only - All augmenting cartridges (increments) removed when firing at less that 500 meters is required.

NOTE

Use only UK firing tables. Maximum rate of fire in M29A1 is 8 rounds per minute.

NOTE

When removing augmenting cartridges (increments) for the selection of charges, care must be exercised that the open ends of the cartridge remaining continue to be staggered.

PREPARING L15A4 CARTRIDGE FOR FIRING

1 Adjust selector to give the desired action by alining the slot with D (delays) or SQ (superquick).

2 Remove safety pin.

3 If safety pin is withdrawn and you decide not to fire, immediately reinsert safety pin.

NOTE

If safety pin cannot be reinserted, place cartridge in a remote location for disposal by authorized personnel.

FOREIGN AMMUNITION (NATO) - Continued.

NOTE

Except as noted above, preparation for firing UK munitions in US Weapons Systems (misfire procedures, precautions during firing, etc) are as contained in chapter 2 of this technical manual.

The following CA munitions are authorized for use in US 81-mm Mortar M29A1:

CA CARTRIDGE, 81-mm, HE, L15A4 and M374A2.

Projectile	81-mm, HE, L154A4 and M374A2
Propelling charge	M90A1 (M374A2), *MK2 (L15A4)
Fuze	L35A1, (L15A4), *percussion (PD) M524A6 (M374A2), point detonating

*Same as UK

NOTE

- When firing cartridge L15A4 in the US M29A1 cannon, the maximum propelling charge is limited to (5) augmenting cartridges (increments). Remove the first L34A2 augmenting cartridge (increment) (the one that is located nearest the fuze).

- CA MK2 propelling charges 6 through 1 are assembled in accordance with UK MK2 propelling charges 6 through 1.

- CA firing tables must be used.

- The sustained rate of fire for CA 81-mm (L15A4/M374A2) is (8) rounds per minute for US M29A1 mortar.

FOREIGN AMMUNITION (NATO) - Continued.

NOTE

Except as noted above, preparation for firing CA munitions in US Weapons Systems (misfire procedures, precautions during firing, etc) are as contained in chapter 2 of this technical manual.

The following US munitions are authorized for use in UK and CA 81-mm mortars L16A1 and L16A2.

US CARTRIDGE, 81-MM, HE, M374A2

Projectile	M374A2
Propelling charge	M90A1
Fuze	M524A6
Cannon used with	UK L16A1, UK L16A2
NSN	1315-00-498-6407 (Give only indicated NSN)

US CARTRIDGE, 81-MM, HE, M374A3:

Projectile	M374A3
Propelling charge	M205
Fuze	M567
Cannon used with	UK L16A1, UK L16A2
NSN	1315-00-563-7067 (Give only indicated NSN)

NOTE

Use US firing tables. Maximum rate of fire is 12 rounds per minute in L16A1 and 15 rounds per minute in L16A2.

The following NO munitions are authorized for use in US 81-mm Mortar M29A1:

NO CARTRIDGE, 81-MM, ILLUM., M301A1, M301A2.

Projectile	81-mm illuminating M301A1, M301A2
Propelling charge	M2A1
Ignition cartridge	M6
Fuze	M84, Time

NOTE

Use 2 or more increments of M2A1 propelling charge when firing M301A1 and M301A2 munitions.

FOREIGN AMMUNITION (NATO) - Continued.

NOTE

- US will use firing table 81-AB-2 when firing the NO M301A1/M301A2 illuminating cartridge in US M29A1 mortar.
- The sustained rates of fire for 81-mm munitions are 8 rounds per minute in the M29A1 and 12 rounds per minute in the L16A1 weapons.
- Except as noted above, preparation for firing NO munitions in US Weapons Systems (misfire procedures, precautions during firing, etc) are as contained in chapter 2 of this technical manual.

The following US munitions are authorized for use in NO. 81-MM Mortar L16A1.

US CARTRIDGE, 81-MM, ILLUM., M301A3.

Projectile	M301A3
Propelling charge	M185
Ignition cartridge	M66E1, M66A1
Fuze	M84, Time

NOTE

- Appropriate firing tables will be used for interoperability firings.
- Illustrations, use, description, functioning, limitations, etc., for the above UK and CA ammunition are contained in TM 43-0001-28-3.

APPENDIX A
REFERENCES

SCOPE.

This appendix lists all forms, technical manuals, field manuals, and miscellaneous publications referenced in this manual.

FORMS.

Recommended Changes to Equipment Publications and Blank Forms	DA Form 2028
Hand Receipt/Annex Number	DA Form 2062
Equipment Inspection and Maintenance Worksheet (ED Jan 64 will be used)	DA Form 2404
Weapon Record Data	DA Form 2408-4
Quality Deficiency Report	SF 368

TECHNICAL MANUALS.

Operator's Manual for Mortar, 81-mm, M29A1, Hand Receipt	TM 9- 1015-200-10-HR
Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools List for Plotting Board, Indirect Fire, M16 W/E (1120-00-601-7941) and M19 W/E (1220-01-059-7989)	TM 9-1220-243- 12&P

Operator and Organizational Maintenance Manual: Sight, Bore, Optical M45 (T151E) (NSN 1240-00-690-8811) ..... TM 9-1240-278-12

Operator's and Organizational Maintenance Manual (Including Repair Parts and Special Tools List) for 81-mm Mortar Training Device 81-mm Sabot (Inert) M1 and 22-mm Subcaliber Practice Cartridges M744, M745, M746 and M747 ..... TM 9-1315-249-12&P

Operator and Organizational Maintenance Manual for Trainer, Mortar: Pneumatic, M32A1 W/E (6920-00-045-6537) ..... TM 9-6920-212-14

Army Ammunition Data Sheets for Artillery Ammunition: Gun, Howitzers, Mortars, Recoilless Rifles and Grenade Launchers (Federal Supply Class 1310, 1315, 1320, 1390) ..... TM 43-0001-28-3

MISCELLANEOUS PUBLICATIONS.

Army Medical Department Expendable/Durable Items ..... CTA 8-100

Expendable/Durable Items (except: Medical, Class V, Repair Parts and Heraldic Items) ..... CTA 50-970

The Army Maintenance Management System (TAMMS) ..... DA PAM 738-750

FIELD MANUALS.

Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to − 65°F)	FM 9-207
First Aid for Soldiers	FM 21-11
81-mm Mortar	FM 23-90
Basic Cold Weather Manual	FM 31-70
Northern Operations	FM 31-71

APPENDIX B
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

SCOPE.

This appendix lists components of end item and basic issue items for the 81-mm mortar to help you inventory items required for safe and efficient operation.

GENERAL.

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. *Section II. Components of End Item.* This listing is for informational purposes only and is not authority to requisition replacements. These items are part of the end item but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. *Section III. Basic Issue Items.* These are the minimum essential items required to place the 81-mm mortar in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the 81-mm mortar during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

EXPLANATION OF COLUMNS.

The following provides an explanation of columns in the tabular listings:

a. *Column (1) - Illustration Number (Illus Number).* Indicates the number of the illustration in which the item is shown.

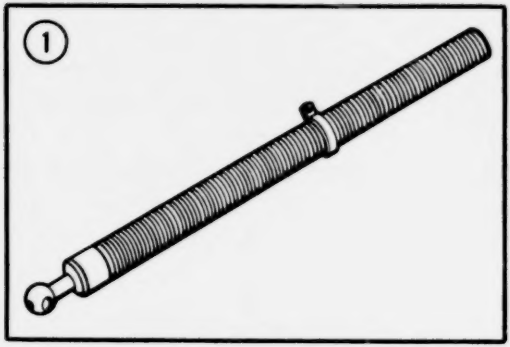
b. *Column (2) - National Stock Number.* Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

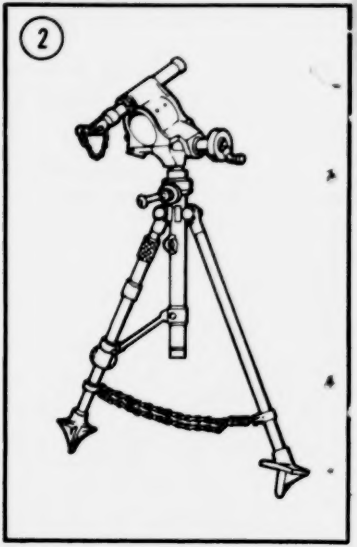
c. *Column (3) - Description.* Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

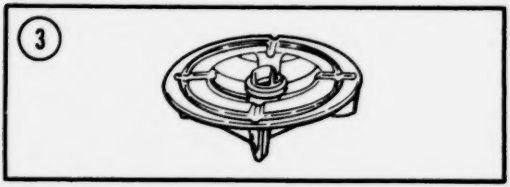
d. *Column (4) - Unit of Measure (U/M).* Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr).

e. *Column (5) - Quantity Required (Qty rqr).* Indicates the quantity of the item authorized to be used with/on the equipment.

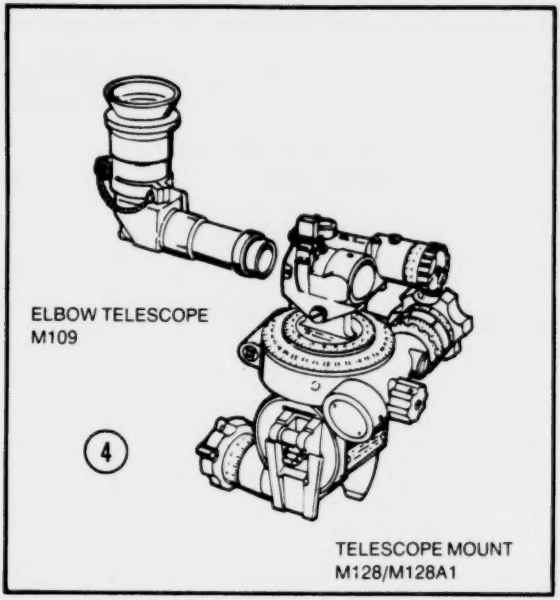
Section II. COMPONENTS OF END ITEM





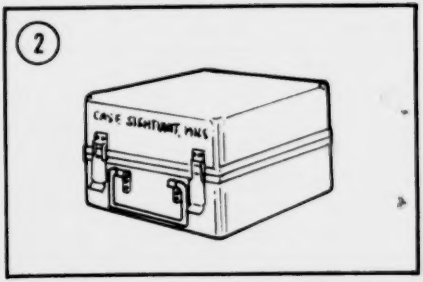


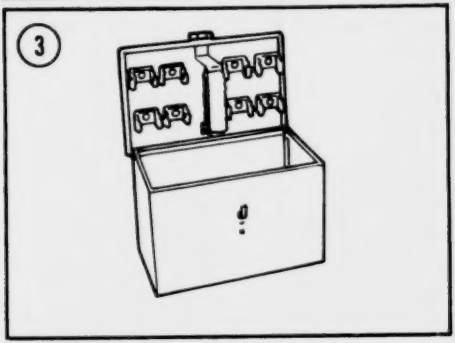
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty rqr
1	1015-00-722-5535	CANNON, 81-MM: M29A1 (19206) 8766507		EA	1
2		BIPOD ASSEMBLY: M23A1 (19206) 11578362		EA	1
3	1015-00-592-5312	BASEPLATE, MORTAR: M3 (19206) 7309128		EA	1

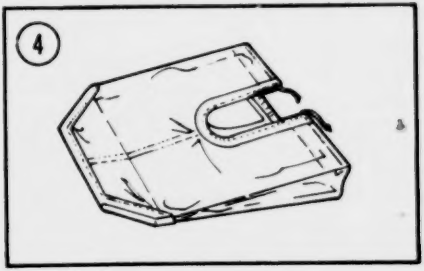

ELBOW TELESCOPE
M109
4
TELESCOPE MOUNT
M128/M128A1

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty rqr
.4		SIGHTUNIT M53 (19200) 8245971 Consists of:		EA	1
	1240-00-823-5613	MOUNT, TELESCOPE M128 (19200) (8235970)			
	1240-00-823-5612	TELESCOPE, ELBOW M109 (19200) (8588780)			
		OR			
		SIGHTUNIT M53A1 (19200) 10559698 Consists of:		EA	1
	1240-00-181-4806	MOUNT, TELESCOPE M128A1 (19200) (10559699)			
	1240-00-823-5612	TELESCOPE, ELBOW M109 (19200) (8588780)			

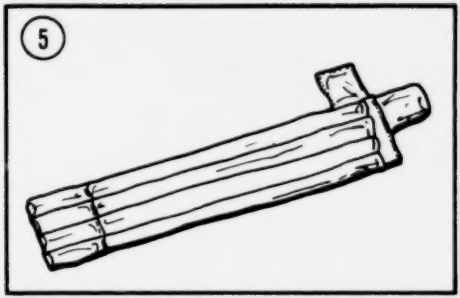
Section III. BASIC ISSUE ITEMS







(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty rqr
1	1005-00-610-8828	BRUSH, CLEANING, SMALL ARMS: M6 (19204) 6108828		EA	1
2	1240-00-823-5611	CASE, CARRYING, SIGHTUNIT: M166 (19200) 8246041		EA	1
3	1240-00-654-6089	CHEST, LIGHTING EQUIPMENT: M14 (19200) 6546089		EA	1
4	1240-00-084-0277	COVER ASSEMBLY, SIGHTUNIT (19200) 8213198		EA	1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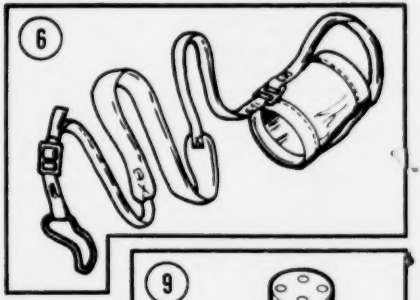
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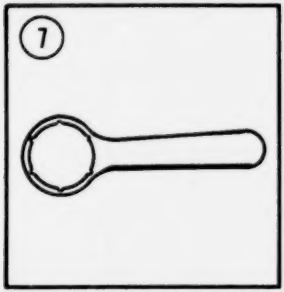
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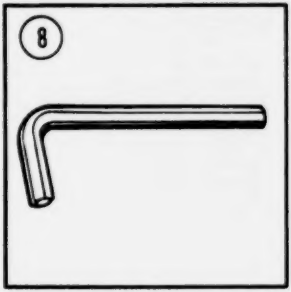
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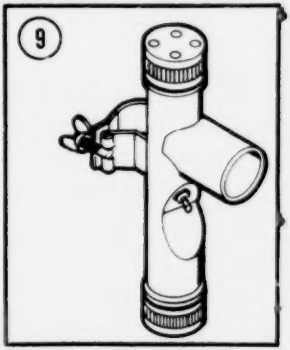
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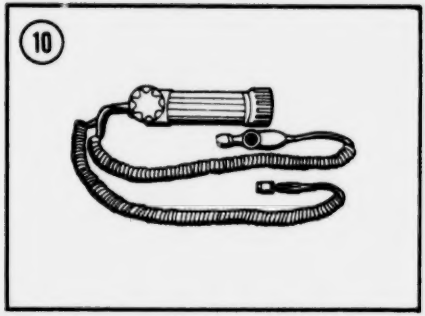
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty rqr
5	1290-00-653-7993	COVER, AIMING POST: M401 (19200) 6537993		EA	1
6	1015-00-723-7701	COVER, GUN MUZZLE (19206) 7237701		EA	1
7	1290-00-767-6038	FUZE SETTER: M25 (19200) 7676038		EA	1
8	5120-00-198-5400	KEY, SOCKET HEAD (81348) GGG-K-275		EA	1
9	1290-01-148-4821	LIGHT, AIMING POST: M14 (19200) 11785401		EA	2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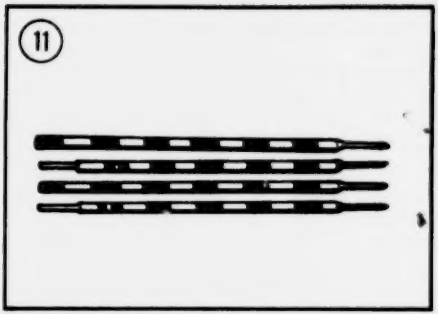
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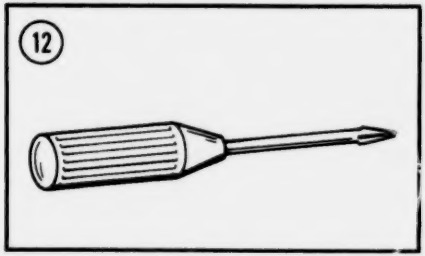
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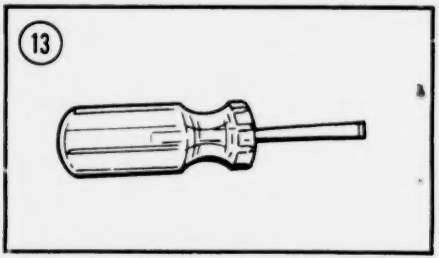
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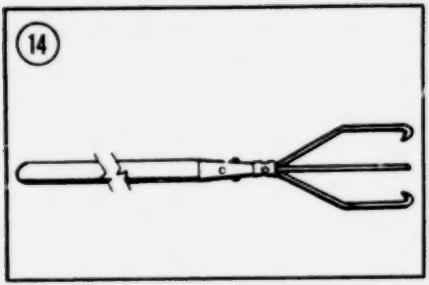
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty rqr
10	1290-00-089-1876	LIGHT, INSTRUMENT: M53E1 (19200) 10553463		EA	1
11	1290-00-535-7617	POST, AIMING: M1A2 (19200) 7687114		EA	2
12	5120-00-240-8716	SCREWDRIVER, CROSS TIP (81348) GGG-S-121		EA	1
13	5120-00-278-1269	SCREWDRIVER, FLAT TIP (81348) GGG-S-121		EA	1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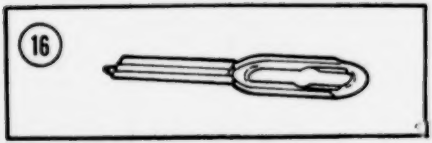
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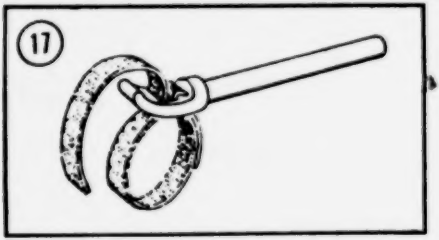
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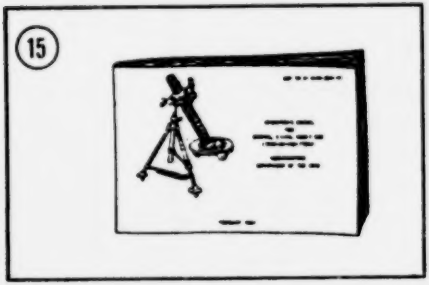
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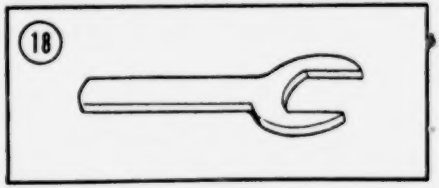
18

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty rqr
14	1015-00-557-0617	STAFF, CLEANING, ARTILLERY (19206) 5570617		EA	1
15		TM 9-1015-200-10		EA	1
16	4933-00-723-1161	WRENCH, FUZE: M18 (19206) 7231161		EA	1
17	5120-00-262-8491	WRENCH, PIPE, STRAP (19207) 5576345		EA	1
18	5120-00-203-4801	WRENCH, FUZE SETTING, 1 3/4-inch (58536) A-A-1353		EA	1

APPENDIX C
ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

SCOPE.

This appendix lists additional items you are authorized for the support of the 81-mm mortar.

GENERAL.

This list identifies items that do not have to accompany the 81-mm mortar and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

EXPLANATION OF LISTING.

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

Section II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION FSCM AND PART NUMBER USABLE ON CODE	(3) U/M	(4) QTY AUTH
1015-00-908-7342	ARM, SIGHT EXTENSION (19207) 10932389	EA	1
8105-00-285-4744	BAG, SAND (81349) MIL-B-12233	EA	1
7510-00-889-3494	BINDER, LOOSELEAF (19207) 11677003	EA	1
6650-00-530-0973	BINOCULAR, M13A1 (19200) 6702509	EA	1
1220-00-602-7941	BOARD, PLOTTING: M16 (19200) 8270330	EA	1

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION FSCM AND PART NUMBER USABLE ON CODE	(3) U/M	(4) QTY AUTH
1240-00-690-8811	BORESIGHT: M45 (19200) 5800859	EA	1
1290-00-930-4260	COMPASS MAGNETIC, M2 (19200) 10547166	EA	1
4930-00-287-8474	OILER, HAND (96906) MS15765-1	EA	1
1220-00-983-3921	SCALE, GRAPHICAL FIRING, M60 (19200) 8565636	EA	1
5120-00-278-1269	SCREWDRIVER, FLAT TIP (81348) GGG-S-121	EA	1

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION FSCM AND PART NUMBER USABLE ON CODE	(3) U/M	(4) QTY AUTH
5120-00-180-0728	SCREWDRIVER, JEWELER'S SWIVEL KNOB (96906) MS15230-4	EA	1
1015-00-034-4842	STRAP, TIEDOWN, MORTAR (19207) 10890786	EA	1
2540-00-052-9481	STRAP, WEBBING (19207) 8690467	EA	1
6675-00-240-1881	TRIPOD, SURVEYING: (for arctic use only) (81349) MIL-T-11674	EA	1

APPENDIX D
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

SCOPE.

This appendix lists expendable/durable supplies and materials you will need to operate and maintain the 81-mm mortar. This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

EXPLANATION OF COLUMNS.

a. *Column (1) - Item Number.* This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 7, app D").

b. *Column (2) - Level.* This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

c. *Column (3) - National Stock Number.* This is the National stock number assigned to the item; use it to request or requisition the item.

d. *Column (4) - Description.* Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. *Column (5) - Unit of Measure (U/M).* Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	C	6810-00-201-0906	ALCOHOL, DENATURED (81348) OE-760	PT
2	C	6135-00-120-1020	BATTERY, DRY:1.5 V, (81349) Type BA-30	EA
3	C	6135-00-930-0030	BATTERY, DRY: (for cold weather operations only) (80058) Type BA-3030	EA

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
4	C	7920-00-205-2401	BRUSH, CLEANING TOOL AND PARTS: Chinese bristle, rd (81349) MILS43871	EA
5	C	8020-00-242-7266	BRUSH, PAINT: 3 in. size (96906) MS16866	EA
6			CLEANING COMPOUND, OPTICAL LENS: Liquid (81349) MILC43454	
	C	6850-00-227-1887	1 qt bottle	QT
	C	6850-00-392-9751	2 oz bottle	OZ

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
7	C		CLEANING COMPOUND, RIFLE BORE (RBC): Solution type (81349) MIL-C-372	
		6850-00-224-6657	8 oz can	OZ
8	C		CLOTH, ABRASIVE: Crocus (81348) PC-458	
		5350-00-221-0872	50 sheet package	SH
9	C		DRY CLEANING SOLVENT (SD) (81348) P-D-680	
		6850-00-281-1985	1 gal can	GL

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
10	C	8010-00-111-7937	ENAMEL: forest green (81349) MIL-E-52798 1 gal can	GL
11	C	8415-00-823-7457	GLOVES, CHEMICAL AND SOLVENT RESISTANT (81348) ZZ-G-381	PR
12	C	6240-00-635-9800	LAMP, INCANDESCENT (96906) MS51608-3	EA

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
13	C	9150-00-231-2361	LUBRICATING OIL, GENERAL PURPOSE (81349) MIL-L-3150	QT
14	C		LUBRICATING OIL, WEAPONS (LAW) (81349) MILL14107	
		9150-00-292-9689	1 qt can	QT

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
15	C	6640-00-663-0832	PAPER, LENS: tissue, sheet form (81348) NNNP40	EA
16	C	7920-00-205-1711	RAG, WIPING (81348) A-A-531 50 lb bale	LB
17	C	8010-00-160-5791	THINNER, SYNTHETIC (81348) TT-T-306 1 pt can	PT

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